NASA SP-7039(34)
Section 1
Abstracts

NASA SP-7039(34) NASA Patent Abstracts Bibliography (Section 1 Abstracts) JANUARY 1989

NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JANUARY 1989

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Bibliography Number	*STAR Accession Numbers*
NASA SP-7039(04) SEC 1	N69-20701 - N73-33931
NASA SP-7039(12) SEC 1	N74-10001 - N77-34042
NASA SP-7039(13) SEC 1	N78-10001 - N78-22018
NASA SP-7039(14) SEC 1	N78-22019 - N78-34034
NASA SP-7039(15) SEC 1	N79-10001 - N79-21993
NASA SP-7039(16) SEC 1	N79-21994 - N79-34158
NASA SP-7039(17) SEC 1	N80-10001 - N80-22254
NASA SP-7039(18) SEC 1	N80-22255 - N80-34339
NASA SP-7039(19) SEC 1	N81-10001 - N81-21997
NASA SP-7039(20) SEC 1	N81-21998 - N81-34139
NASA SP-7039(21) SEC 1	N82-10001 - N82-22140
NASA SP-7039(22) SEC 1	N82-22141 - N82-34341
NASA SP-7039(23) SEC 1	N83-10001 - N83-23266
NASA SP-7039(24) SEC 1	N83-23267 - N83-37053
NASA SP-7039(25) SEC 1	N84-10001 - N84-22526
NASA SP-7039(26) SEC 1	N84-22527 - N84-35284
NASA SP-7039(27) SEC 1	N85-10001 - N85-22341
NASA SP-7039(28) SEC 1	N85-22342 - N85-36162
NASA SP-7039(29) SEC 1	N86-10001 - N86-22536
NASA SP-7039(30) SEC 1	N86-22537 - N86-33262
NASA SP-7039(31) SEC 1	N87-10001 - N87-20170
NASA SP-7039(32) SEC 1	N87-20171 - N87-30248
NASA SP-7039(33) SEC 1	N88-10001 - N88-20253
NASA SP-7039(34) SEC 1	N88-20254 - N88-30583

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by RMS Associates.

NASA SP-7039(34)
Section 1
Abstracts

NASA

PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in *Scientific and Technical Aerospace Reports (STAR)* between July 1988 and December 1988.

Scientific and Technical Information Division 1989
National Aeronautics and Space Administration
Washington, DC

This supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, price code A04.

INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

The *NASA Patent Abstracts Bibliography (NASA PAB)* is a semiannual NASA publication containing comprehensive abstracts and indexes of NASA-owned inventions covered by U.S. patents and applications for patent. The citations included in *NASA PAB* were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

For the convenience of the user, each issue of *NASA PAB* has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in *STAR* since 1969. Thus a complete set of *NASA PAB* would consist of the Abstract Sections of Issue 04 (January 1974) and Issue 12 (January 1978) and the Abstract Section for all subsequent issues and the Index Section for the most recent issue.

The 124 citations published in this issue of the Abstract Section cover the period July 1988 through December 1988. The Index Section references over 4600 citations covering the period May 1969 through December 1988.

ABSTRACT SECTION (SECTION 1)

This *PAB* issue includes 10 major subject divisions separated into 76 specific categories and one general category/division. (See Table of Contents for the scope note of each category, under which are grouped appropriate NASA inventions.) This scheme was devised in 1975 and revised in 1987 in lieu of the 34 category divisions which were utilized in *PAB* supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a *STAR* citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in order of the ascending NASA Accession Number originally assigned for *STAR* to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

Abstract Citation Data Elements: Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

NASA Accession Number
NASA Case Number
Inventor's Name
Title of Invention
U.S. Patent Application Serial Number
U.S. Patent Number (for issued patents only)
U.S. Patent Office Classification Number(s)
(for issued patents only)

These data elements are identified in the Typical Citation and Abstract and in the indexes.

INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes. These indexes are cross-indexed and are used to locate a single invention or groups of inventions.

Subject Index: Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Inventor Index: Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Source Index: Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Number Index: Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the Accession Number.

Accession Number Index: Lists all inventions in order of ascending Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible with the flexibility incorporated into the *NASA PAB*.

(1) *Using Subject Category:* To identify all NASA inventions in any one of the subject categories in this issue of *NASA PAB*, select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

(2) *Using Subject Index:* To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (1) use the Subject Category Number to locate the Subject Category and (2) use the Accession Number to locate the desired invention within the Subject Category listing.

(3) *Using Patent Classification Index:* To identify all inventions covered by issued NASA patents (not including applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

TYPICAL CITATION AND ABSTRACT

NASA SPONSORED

ACCESSION NUMBER → **N88-23809*** *National Aeronautics and Space Administration.*
Langley Research Center, Hampton, Va. ← CORPORATE SOURCE

TITLE → **HELICOPTER ANTI-TORQUE SYSTEM USING FUSELAGE STRAKES Patent**

INVENTORS → HENRY L. KELLEY, inventor (to NASA) and JOHN C. WILSON, *inventor (to NASA) 24 Nov. 1987 9 p Filed 30 Jan. 1987*
Supersedes N87-23630 (25 - 17, p 2287)

NASA CASE NUMBER → (NASA-CASE-LAR-13630-1; US-PATENT-4,708,305;

US PATENT APPLICATIONS SERIAL NUMBER → US-PATENT-APPL-SN-008895; US-PATENT-CLASS-244-17.19;
US-PATENT-CLASS-244-91) Avail: US Patent and Trademark Office ← AVAILABILITY SOURCE

COSATI CODE → *CSCL 01C*

The improvement of the helicopter torque control system is discussed. At low to medium forward speeds helicopter performance is limited by the effectiveness of the means for counteracting main rotor torque and controlling sideslip airloads. These problems may be overcome by mounting strakes on the aft fuselage section. For single rotor helicopters whose main rotor rotates counter-clockwise as viewed from above, one of the strakes would be mounted in the upper lefthand quadrant and the second in the lower left hand quadrant. The strakes alter the air flow around the fuselage by separating the flow so as to produce lateral airloads on the tail boom which oppose main-rotor torque. The upper strake operates in a right crosswind to oppose main rotor torque, and the lower strake has effect in left crosswinds. The novelty of this invention resides in the simple and economical manner in which the helicopter tail boom may be modified by the addition of strakes in order to increase torque control, and reduce the need for supplemental mechanical means of torque control.
Official Gazette of the U.S. Patent and Trademark Office

ABSTRACT

KEY ILLUSTRATION

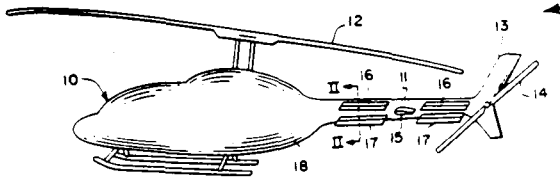


TABLE OF CONTENTS

Section 1 • Abstracts

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) N.A.

43 EARTH RESOURCES AND REMOTE SENSING N.A.

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION N.A.

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

45 ENVIRONMENT POLLUTION N.A.

Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS N.A.

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY N.A.

Includes weather forecasting and modification.

48 OCEANOGRAPHY N.A.

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL) N.A.

52 AEROSPACE MEDICINE N.A.

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES N.A.

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 36

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY N.A.

Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 60

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE N.A.

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS N.A.

Includes computer networks and special application computer systems.

63 CYBERNETICS N.A.

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS N.A.

Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY N.A.

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS N.A.

Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS N.A.

Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

For related information see also *Engineering.*

70 PHYSICS (GENERAL) N.A.

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

Note: N.A. means that no abstracts were assigned to this category for this issue.

Section 2 • Indexes

JANUARY 1989 (Supplement 34)

NASA Patent Abstracts Bibliography

A Semiannual Publication of the National Aeronautics and Space Administration

02

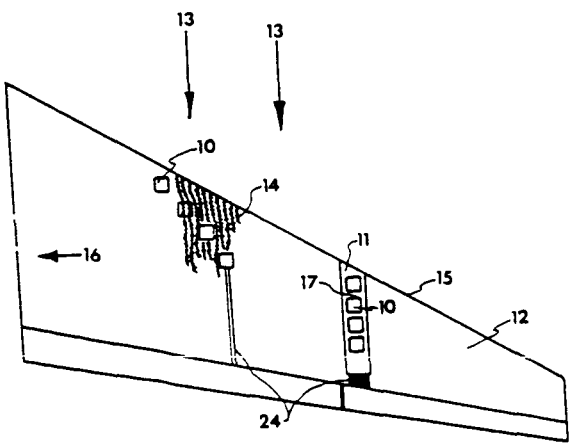
AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

N88-23759* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CROSSFLOW VORTICITY SENSOR Patent
BRUCE J. HOLMES, inventor (to NASA), DEBRA L. CARRAWAY, inventor (to NASA) (Old Dominion Univ., Hampton, Va.), HARLAN K. HOLMES, inventor (to NASA), and THOMAS C. MOORE, inventor (to NASA) 1 Mar. 1988 9 p Filed 15 Jan. 1987 Supersedes N87-23587 (25 - 19, p 2616)
(NASA-CASE-LAR-13436-1-CU; US-PATENT-4,727,751; US-PATENT-APPL-SN-003676; US-PATENT-CLASS-73-147; US-PATENT-CLASS-73-178-R) Avail: US Patent and Trademark Office CSCL 01A

A crossflow vorticity sensor for the detection of crossflow vorticity characteristics is described. The sensor is comprised of crossflow sensors which are noninvasively adhered to a swept wing laminar surface either singularly, in multi-element strips, in polar patterns, or in orthogonal patterns. These crossflow sensors are comprised of hot-film sensor elements which operate as a constant temperature anemometer circuit to detect heat transfer rate changes. Accordingly, crossflow vorticity characteristics are determined via cross-correlation. In addition, the crossflow sensors have a thickness which does not exceed a maximum value h in order to avoid contamination of downstream crossflow sensors.

Official Gazette of the U.S. Patent and Trademark Office



04

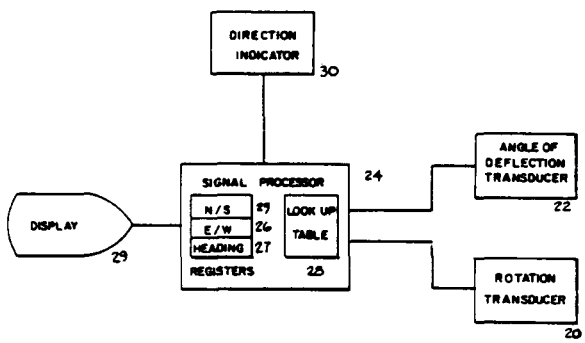
AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

N88-24620*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NAVIGATION SYSTEM FOR LAND VEHICLES Patent Application
H. DOUGLAS GARNER, inventor (to NASA) 18 May 1988 10 p
(NASA-CASE-LAR-13322-1; NAS 1.71:LAR-13322-1; US-PATENT-APPL-SN-195221) Avail: NTIS HC A02/MF A01 CSCL 17G

The invention is a navigation system for land vehicles. Prior methods of determining vehicle heading have been either too expensive or too inaccurate for widespread use in automotive vehicles. The novel aspect of this invention is that it determines vehicle heading by utilizing an inexpensive angle-of-deflection transducer connected to the vehicle steering wheel, and a microcomputer with a look-up table to compensate for the nonlinear relationship between the angle of deflection of the steering wheel or linkage and that of the road wheel. The system comprises a distance transducer, a steering wheel look-up table, and a positioning display. The signal processor operates on distance information and heading information from the transducers, the look-up table compensates for the nonlinear relationship between the steering wheel angle and the angle of the road wheel, and the resulting position information is displayed.

NASA

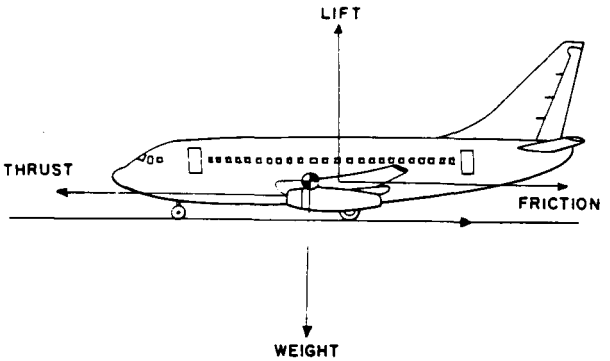


N88-24621*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRPLANE RUNWAY PERFORMANCE MONITORING SYSTEM Patent Application
DAVID B. MIDDLETON, inventor (to NASA), RAGHAVACHARI SRIVATSAN, inventor (to NASA) (Kansas Univ., Lawrence.), and LEE H. PERSON, JR., inventor (to NASA) 11 May 1988 43 p
(NASA-CASE-LAR-13854-1-CU; NAS 1.71:LAR-13854-1-CU;

US-PATENT-APPL-SN-192562) Avail: NTIS HC A03/MF A01 CSCL 17G

The invention is a real-time takeoff and landing performance monitoring system for an aircraft which provides a pilot with graphic and metric information to assist in decisions related to achieving rotation speed within the safe zone of a runway, or stopping the aircraft on the runway after landing or takeoff abort. By comparing the present performance of the aircraft with a predicted nominal performance based upon given conditions, performance deficiencies are detected by the system. The system provides a head-down display and a head-up display. The head-up display is projected onto a partially reflective transparent surface through which the pilot views the runway. Hence, the system supplies the pilot with critical status information while allowing the pilot to continue to view the runway.

NASA



05

AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

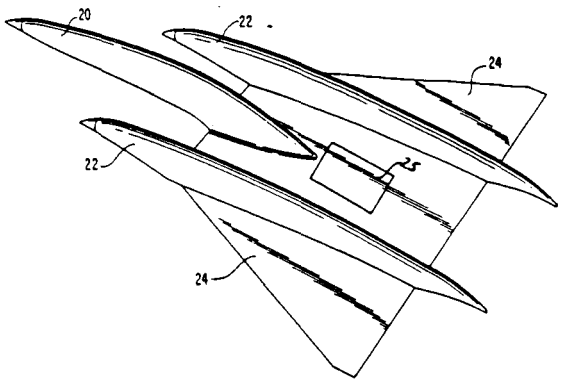
N88-23765* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MULTI-BODY AIRCRAFT WITH AN ALL-MOVABLE CENTER FUSELAGE ACTIVELY CONTROLLING FUSELAGE PRESSURE DRAG Patent

RICHARD M. WOOD, inventor (to NASA) 5 Apr. 1988 7 p Filed 12 Feb. 1987 Supersedes N87-25320 (25 - 19, p 2571) (NASA-CASE-LAR-13511-1; US-PATENT-4,735,381; US-PATENT-APPL-SN-013801; US-PATENT-CLASS-244-130; US-PATENT-CLASS-244-119; US-PATENT-CLASS-244-120; US-PATENT-CLASS-244-15) Avail: US Patent and Trademark Office CSCL 01C

A multi-body aircraft with an all-movable center fuselage which translates relative to two side fuselages is described. At subsonic and transonic flight the center fuselage is in a forward position. At supersonic speeds the center fuselage moves aft so as to ensure optimum aerodynamic interference at particular Mach numbers. This provides an increased shock strength and greater surface areas so the significant reductions in zero-lift wave drag can be achieved. This concept allows for a significant increase in the wing aspect ratio which would improve high-lift performance at all speeds without incurring a significant supersonic zero-lift wave drag penalty. In addition to an improved low-fineness ratio, high-speed performance is achieved at all speeds and for all flight conditions.

Official Gazette of the U.S. Patent and Trademark Office



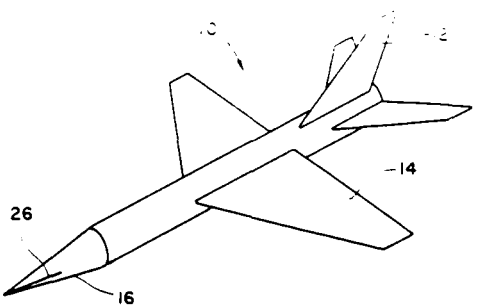
N88-24628*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ACTUATED FOREBODY STRAKES Patent Application

DANIEL G. MURRI, inventor (to NASA) 11 May 1988 22 p (NASA-CASE-LAR-13983-1; NAS 1.71:LAR-13983-1; US-PATENT-APPL-SN-192563) Avail: NTIS HC A03/MF A01 CSCL 01C

Actuated forebody strakes provide yaw control at high angles of attack. In one embodiment, the strakes are axially slidable in the forebody to be deployed out of slots provided for the strakes in the forebody. In another embodiment, the strakes are pivotally connected at the tip of the strakes to pivot radially outwardly out of the slots provided in the forebody. In another embodiment, the forebody is provided with either a single strake or two strakes and the forebody is rotatable to vary the radial location of the strake or strakes. All embodiments achieve significant yaw control capability over a wide angle of attack and sideslip ranges.

NASA



N88-28914* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

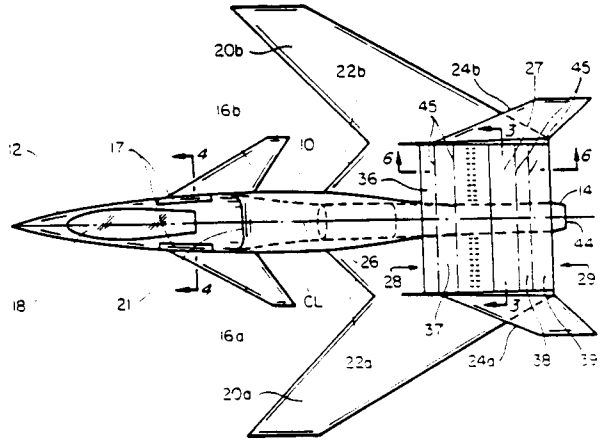
HIGH PERFORMANCE FORWARD SWEPT WING AIRCRAFT Patent

DAVID G. KOENIG, inventor (to NASA), KIYOSHI AOYAGI, inventor (to NASA), MICHAEL R. DUDLEY, inventor (to NASA), and SUSAN B. SCHMIDT, inventor (to NASA) 30 Aug. 1988 14 p Filed 24 Nov. 1986 Supersedes N87-18561 (25 - 11, p 1439) (NASA-CASE-ARC-11636-1; US-PATENT-4,767,083; US-PATENT-APPL-SN-933963; US-PATENT-CLASS-244-12.3; US-PATENT-CLASS-244-12.4; US-PATENT-CLASS-244-207;

US-PATENT-CLASS-244-45-A; US-PATENT-CLASS-244-55)
Avail: US Patent and Trademark Office CSCL 01C

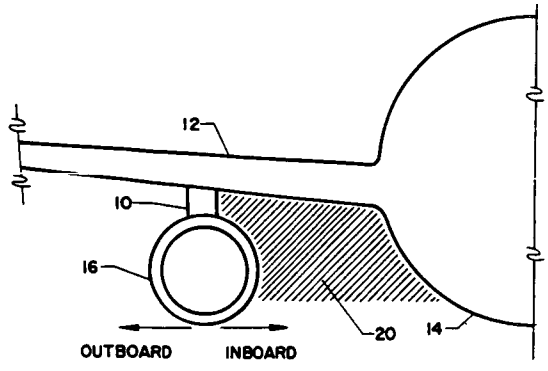
A high performance aircraft capable of subsonic, transonic and supersonic speeds employs a forward swept wing planform and at least one first and second solution ejector located on the inboard section of the wing. A high degree of flow control on the inboard sections of the wing is achieved along with improved maneuverability and control of pitch, roll and yaw. Lift loss is delayed to higher angles of attack than in conventional aircraft. In one embodiment the ejectors may be advantageously positioned spanwise on the wing while the ductwork is kept to a minimum.

Official Gazette of the U.S. Patent and Trademark Office



N88-29789*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPRESSION PYLON Patent Application
JAMES C. PATTERSON, JR., inventor (to NASA) 23 Jun. 1988 14 p
(NASA-CASE-LAR-13777-1; NAS 1.71:LAR-13777-1; US-PATENT-APPL-SN-210480) Avail: NTIS HC A03/MF A01 CSCL 01C

A compression pylon for an aircraft with a wing-mounted engine, that does not cause supersonic airflow to occur within the fuselage-wing-pylon-nacelle channel is presented. The chord length of the pylon is greater than the local chord length of the wing to which it is attached. The maximum thickness of the pylon occurs at a point corresponding to the local trailing edge of the wing. As a result, the airflow through the channel never reaches supersonic velocities. NASA



08

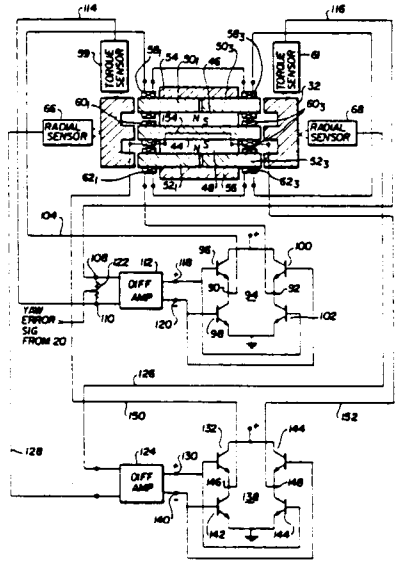
AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N88-23808* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THREE AXIS ATTITUDE CONTROL SYSTEM Patent
PHILIP A. STUDER, inventor (to NASA) 22 Mar. 1988 13 p
Filed 7 Nov. 1985 Supersedes N86-20396 (24 - 11, p 1720)
(NASA-CASE-GSC-12970-1; US-PATENT-4,732,353; US-PATENT-APPL-SN-795805; US-PATENT-CLASS-244-165)
Avail: US Patent and Trademark Office CSCL 01C

A three-axis attitude control system for an orbiting body comprised of a motor driven flywheel supported by a torque producing active magnetic bearing is described. Free rotation of the flywheel is provided about its central axis and together with limited angular torsional deflections of the flywheel about two orthogonal axes which are perpendicular to the central axis. The motor comprises an electronically commutated DC motor, while the magnetic bearing comprises a radially servoed permanent magnet biased magnetic bearing capable of producing cross-axis torques on the flywheel. Three body attitude sensors for pitch, yaw and roll generate respective command signals along three mutually orthogonal axes (x, y, z) which are coupled to circuit means for energizing a set of control coils for producing torques about two of the axes (x and y) and speed control of the flywheel about the third (z) axis. An energy recovery system, which is operative during motor deceleration, is also included which permits the use of a high-speed motor to perform effectively as a reactive wheel suspended in the magnetic bearing.

Official Gazette of the U.S. Patent and Trademark Office



N88-23809* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HELICOPTER ANTI-TORQUE SYSTEM USING FUSELAGE STRAKES Patent
HENRY L. KELLEY, inventor (to NASA) and JOHN C. WILSON, inventor (to NASA) 24 Nov. 1987 9 p Filed 30 Jan. 1987 Supersedes N87-23630 (25 - 17, p 2287)
(NASA-CASE-LAR-13630-1; US-PATENT-4,708,305; US-PATENT-APPL-SN-008895; US-PATENT-CLASS-244-17.19; US-PATENT-CLASS-244-91) Avail: US Patent and Trademark Office CSCL 01C

The improvement of the helicopter torque control system is discussed. At low to medium forward speeds helicopter performance is limited by the effectiveness of the means for counteracting main rotor torque and controlling sideslip airloads. These problems may be overcome by mounting strakes on the aft fuselage section. For single rotor helicopters whose main rotor rotates counter-clockwise as viewed from above, one of the strakes would be mounted in the upper lefthand quadrant and the second in the lower left hand quadrant. The strakes alter the air flow around the fuselage by separating the flow so as to produce lateral airloads on the tail boom which oppose main-rotor torque. The upper strake operates in a right crosswind to oppose main rotor torque, and the lower strake has effect in left crosswinds. The novelty of this invention resides in the simple and economical manner in which the helicopter tail boom may be modified by the addition of strakes in order to increase torque control, and reduce the need for supplemental mechanical means of torque control.

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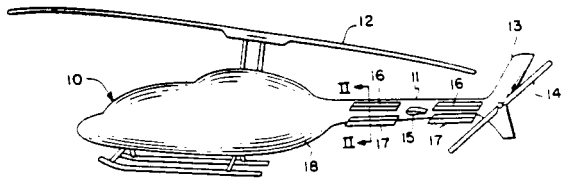


09

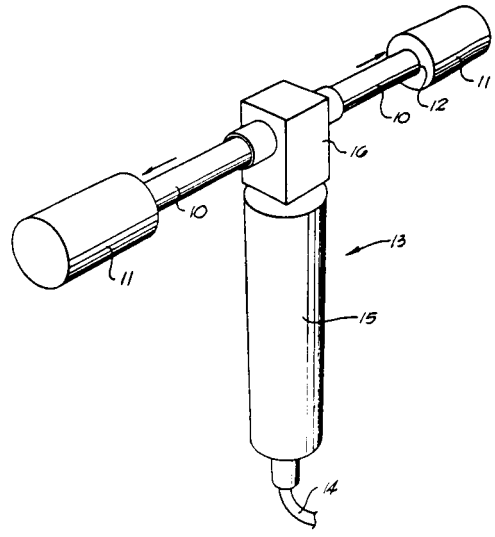
RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

N88-28938*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HIGH TEMPERATURE ELECTRIC ARC FURNACE Patent Application
RICHARD M. POORMAN, inventor (to NASA) and DEBORAH D. SCHMIDT, inventor (to NASA) 13 Jun. 1988 12 p
(NASA-CASE-MFS-28281-1; NAS 1.71:MFS-28281-1; US-PATENT-APPL-SN-205898) Avail: NTIS HC A03/MF A01 CSCL 14B

An apparatus and process for improving the microstructure of electrically conducting materials is disclosed by the present invention. A revolving heat source applies heat to the surface of the material evenly and quickly. One or more heat sinks quickly cool the material. In the preferred embodiment, the cooling may be done in such a way as to promote as high a degree of directional grain growth as desired or completely nondirectional grain growth.

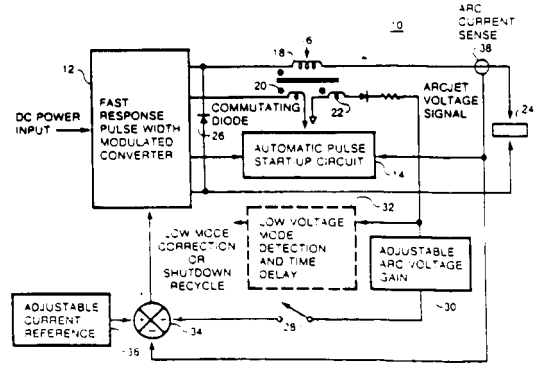
NASA



N88-28939* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ARCJET POWER SUPPLY AND START CIRCUIT Patent
ROBERT P. GRUBER, inventor (to NASA) 30 Aug. 1988 5 p Filed 10 Jun. 1987 Supersedes N87-25335 (25 - 19, p 2573)
(NASA-CASE-LEW-14374-1; US-PATENT-4,766,724; US-PATENT-APPL-SN-060200; US-PATENT-CLASS-60-203.1; US-PATENT-CLASS-219-383; US-PATENT-CLASS-363-97)
Avail: US Patent and Trademark Office CSCL 14B

A dc power supply for spacecraft arcjet thrusters has an integral automatic starting circuit and an output averaging inductor. The output averaging inductor, in series with the load, provides instantaneous current control, and ignition pulse and an isolated signal proportional to the arc voltage. A pulse width modulated converter, close loop configured, is also incorporated to give fast response output current control.

Official Gazette of the U.S. Patent and Trademark Office



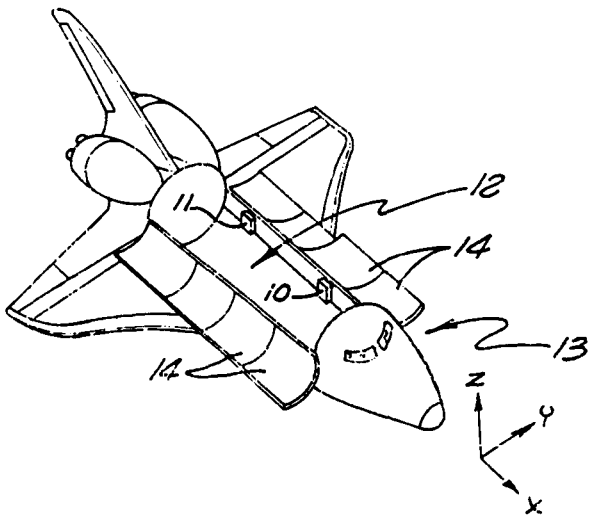
16

SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

N88-24660*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PAYLOAD DEPLOYMENT METHOD AND SYSTEM Patent Application
CLIFFORD J. BARNETT, inventor (to NASA), JOHN E. GREENWOOD, inventor (to NASA), and EARL V. HOLMAN, inventor (to NASA) (Rockwell International Corp., Houston, Tex.) 15 Apr. 1988 14 p
(NASA-CASE-MSC-21330-1; NAS 1.71:MSC-21330-1; US-PATENT-APPL-SN-182000) Avail: NTIS HC A03/MF A01 CSCL 22B

A method and apparatus for deploying the payload of space shuttle or the like is described. It is referred to as the Stabilized Payload Deployment System (SPDS). The payload is rotated about an axis outside of the payload but approximately longitudinally with the cargo bay of the shuttle craft. The payload may thus be rotated through ninety degrees. In this case, that is, in its rotated position, the payload may or may not have a small portion located within the cargo bay. Alternatively, the payload may be located completely outside of the bay. According to the apparatus two separable hinge-like devices connect at one longitudinal side or edge of the payload to respective ones of the payload trunnions at different longitudinally spaced locations along the length of the payload. Separation of the payload from the cargo bay is made by unlatching a latch and by the use of a repulsion spring at the position of each hinge-like device. Two four-link mechanisms allow movement between payload and bay. Such accommodative movement is required especially during launch when considerable vibration is encountered. NASA



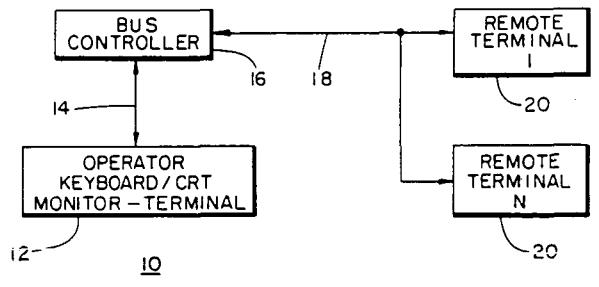
17

SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

N88-24662*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ADAPTIVE DATA ACQUISITION MULTIPLEXING SYSTEM AND METHOD Patent Application
R. L. SINDERSON, inventor (to NASA), G. A. SALAZAR, inventor (to NASA), C. M. HADDICK, JR., inventor (to NASA), C. J. SPAHN, inventor (to NASA), and C. N. VENKATESH, inventor (to NASA) (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) 15 Apr. 1988 27 p
(NASA-CASE-MSC-21170-1; NAS 1.71:MSC-21170-1; US-PATENT-APPL-SN-182266) Avail: NTIS HC 03/MF A01 CSCL 09F

A reconfigurable telemetry multiplexer is discribed which includes a monitor-terminal and a plurality of remote terminals. The remote terminals each include signal conditioning for a plurality of sensors for measuring parameters which are converted by an analog to digital converter. CPU's in the remote terminals store instructions for prompting system configuration and reconfiguration commands. The measurements, instructions and the terminal's present configuration and status data are transmitted to the monitor-terminal and displayed. In response to menu-driven prompts generated and displayed at the monitor-terminal, data generation request commands, status and health commands, and the like are input at the monitor-terminal and transmitted to the remote terminals. The CPU in each remote terminal receives the various commands, stores them in electrically alterable memory and reacts in accordance with the commands to reconfigure a plurality of aspects of the system, generate parameter measurements, status and health signals, and the like; and transmits these signals of the respective terminals to the monitor-terminal for low data rate operator viewing and to higher rate external transmission/monitor equipment. Reconfiguration may be in real time during the general period of parameter measurement acquisition, and may include alteration of the gain, automatic gain rescaling, bias, and or sampling rates associated with one or more of the parameter measurements made by the remote terminals.
NASA



N88-27220*# National Aeronautics and Space Administration. Pasadena Office, Calif.
A VLSI SINGLE-CHIP (225,223) REED-SOLOMON ENCODER WITH INTERLEAVER Patent Application
IN-SHEK HSU, inventor (to NASA), LESLIE J. DEUTSCH, inventor (to NASA), TRIEU-KIE TRUONG, inventor (to NASA), and IRVING S. REED, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 29 Apr. 1988 30 p
(Contract NAS7-918)
(NASA-CASE-NPO-17280-1-CU; NAS 1.71:NPO-17280-1-CU; US-PATENT-APPL-SN-195226) Avail: NTIS HC A03/MF A01 CSCL 09F

The invention relates to a concatenated Reed-Solomon/convolutional encoding system consisting of a Reed-Solomon outer code and a convolutional inner code for downlink telemetry in space missions, and more particularly to a Reed-Solomon encoder with programmable interleaving of the information symbols and code correction symbols to combat error bursts in the Viterbi decoder.
NASA

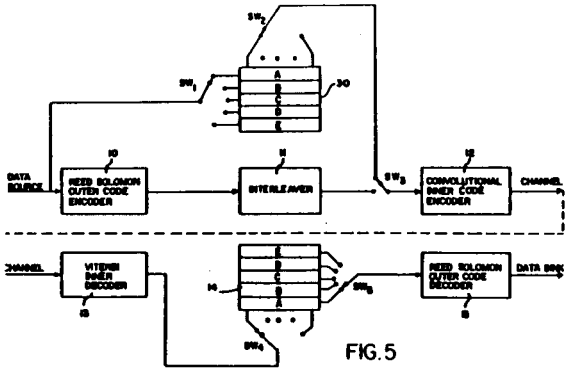
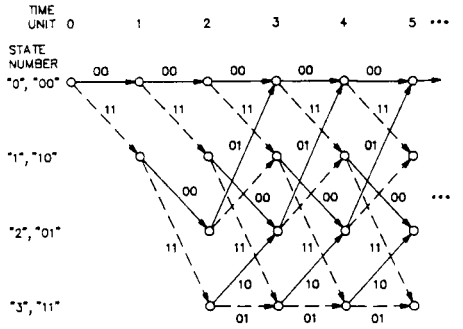


FIG.5

N88-28946*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD FOR VETERBI DECODING OF LARGE CONSTRAINT LENGTH CONVOLUTIONAL CODES Patent Application
IN-SHEK HSU, inventor (to NASA), TRIEU-KIE TRUONG, inventor (to NASA), IRVING S. REED, inventor (to NASA), and SUN JING, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 May 1988 35 p
(NASA-CASE-NPO-17310-1-CU; NAS 1.71:NPO-17310-1-CU; US-PATENT-APPL-SN-200874) Avail: NTIS HC A03/MF A01 CSCL 09F

A new method of Viterbi decoding of convolutional codes lends itself to a pipline VLSI architecture using a single sequential processor to compute the path metrics in the Viterbi trellis. An array method is used to store the path information for NK intervals where N is a number, and K is constraint length. The selected path at the end of each NK interval is then selected from the last entry in the array. A trace-back method is used for returning to the beginning of the selected path back, i.e., to the first time unit of the interval NK to read out the stored branch metrics of the selected path which correspond to the message bits. The decoding decision made in this way is no longer maximum likelihood, but can be almost as good, provided that constraint length K in not too small. The advantage is that for a long message, it is not necessary to provide a large memory to store the trellis derived information until the end of the message to select the path that is to be decoded; the selection is made at the end of every NK time unit, thus decoding a long message in successive blocks.
NASA



TRELLIS DIAGRAM FOR ENCODER

18

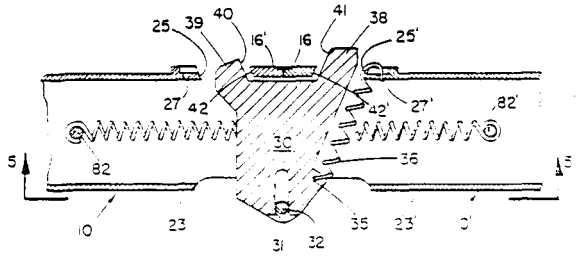
SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

N88-23827* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LOCKING HINGE Patent
CLARENCE J. WESSELSKI, inventor (to NASA) 12 Apr. 1988 9 p Filed 29 Oct. 1986 Supersedes N87-18595 (25 - 11, p 1446)
(NASA-CASE-MSC-21056-1; US-PATENT-4,736,490; US-PATENT-APPL-SN-934397; US-PATENT-CLASS-16-292; US-PATENT-CLASS-16-297; US-PATENT-CLASS-16-326; US-PATENT-CLASS-16-332; US-PATENT-CLASS-16-345; US-PATENT-CLASS-16-347; US-PATENT-CLASS-16-349) Avail: US Patent and Trademark Office CSCL 22B

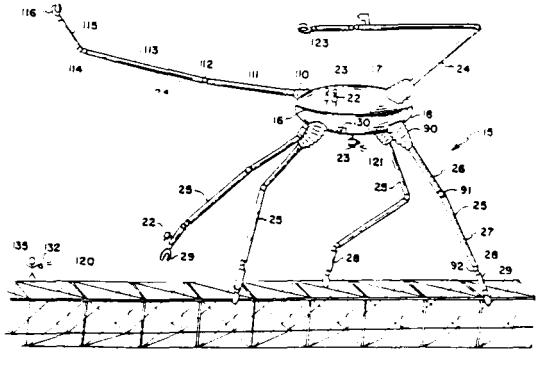
The space station configuration currently studied utilizes structures which require struts to be hinged in the middle in the stowed mode and locked into place in the deployed mode. Since there are hundreds of hinges involved, it is necessary that they have simple, positive locking features with a minimum of joint looseness or slack. This invention comprises two similar housings hinged together with a spring loaded locking member which assists in making as well as breaking the lock. This invention comprises a bracket hinge and bracket members with a spring biased and movable locking member. The locking or latch member has ear parts received in locking openings where wedging surfaces on the ear parts cooperate with complimentary surfaces on the bracket members for bringing the bracket members into a tight end-to-end alignment when the bracket members are in an extended position. When the locking member is moved to an unlocking position, pivoting of the hinge about a pivot pin automatically places the locking member to retain the locking member in an unlocked position. In pivoting the hinge from an extended position to a folded position, longitudinal spring members are placed under tension over annular rollers so that the spring tension in a folded position assists in return of the hinge from a folded to an extended position. Novelty lies in the creation of a locking hinge which allows compact storage and easy assembly of structural members

having a minimal number of parts.
Official Gazette of the U.S. Patent and Trademark Office



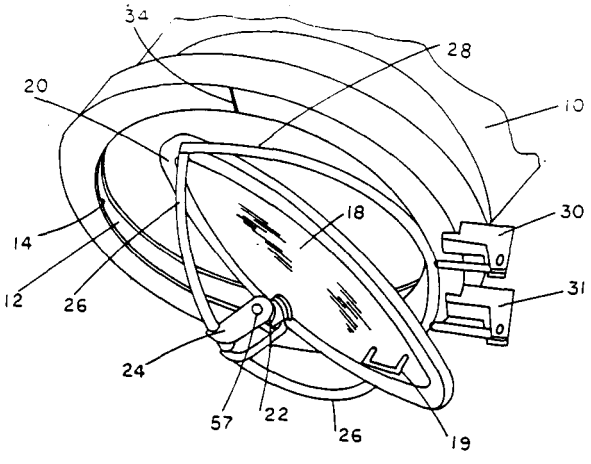
N88-23828* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE SPIDER CRANE Patent
IAN O. MACCONOCHIE, inventor (to NASA), MARTIN M. MIKULAS, JR., inventor (to NASA), JACK E. PENNINGTON, inventor (to NASA), REBECCA L. KINKEAD, inventor (to NASA), and CHARLES F. BRYAN, JR., inventor (to NASA) 19 Apr. 1988 13 p Filed 30 Sep. 1986 Supersedes N87-15259 (25 - 07, p 874)
(NASA-CASE-LAR-13411-1-SB; US-PATENT-4,738,583; US-PATENT-APPL-SN-913432; US-PATENT-CLASS-414-735; US-PATENT-CLASS-414-750; US-PATENT-CLASS-901-1; US-PATENT-CLASS-901-33; US-PATENT-CLASS-180-8.6) Avail: US Patent and Trademark Office CSCL 22B

A space spider crane for the movement, placement, and or assembly of various components on or in the vicinity of a space structure is described. As permanent space structures are utilized by the space program, a means will be required to transport cargo and perform various repair tasks. A space spider crane comprising a small central body with attached manipulators and legs fulfills this requirement. The manipulators may be equipped with constant pressure gripping end effectors or tools to accomplish various repair tasks. The legs are also equipped with constant pressure gripping end effectors to grip the space structure. Control of the space spider crane may be achieved either by computer software or a remotely situated human operator, who maintains visual contact via television cameras mounted on the space spider crane. One possible walking program consists of a parallel motion walking program whereby the small central body alternatively leans forward and backward relative to end effectors.
Official Gazette of the U.S. Patent and Trademark Office



N88-24671*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HATCH COVER Patent Application
CHARLES ALLTON, inventor (to NASA) and JAMES H. OKANE, inventor (to NASA) 9 Mar. 1988 14 p
(NASA-CASE-MSC-21356-1; NAS 1.71:MSC-21356-1; US-PATENT-APPL-SN-165956) Avail: NTIS HC A03/MF A01 CSCL 22B

This invention relates to a hatch and more particularly to a hatch for a space vehicle where the hatch has a low volume sweep and can be easily manipulated from either side of the hatch. The hatch system includes an elliptical opening in a bulkhead and an elliptical hatch member. The hatch cover system includes an elliptical port opening in a housing and an elliptical cover member supported centrally by a rotational bearing for rotation about a rotational axis normal to the cover member and by pivot pins in a gimbal member for pivotal movement about axes perpendicular to the rotational axis. Arm members support the gimbal member pivotally by pivot members so that upon rotation and manipulation the cover member can be articulatedly moved from a closed position to the port opening to an out of the way position with a minimum of volume sweep by the cover member.
NASA



N88-26398* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MOBILE REMOTE MANIPULATOR SYSTEM FOR A TETRAHEDRAL TRUSS Patent
CLARENCE J. WESSELSKI, inventor (to NASA) and WILLIAM C. SCHNEIDER, inventor (to NASA) 19 Jul. 1988 15 p Filed 5 Sep. 1986 Supersedes N87-15260 (25 - 07, p 0875) Sponsored by NASA
(NASA-CASE-MSC-20985-1; US-PATENT-4,757,767; US-PATENT-APPL-SN-904134; US-PATENT-CLASS-104-49; US-PATENT-CLASS-104-35; US-PATENT-CLASS-104-172.1; US-PATENT-CLASS-244-159) Avail: US Patent and Trademark Office CSCL 05H

The mobile remote manipulator system (MRMS) was initially developed for transit about the trusses of the delta space station; however, it can be utilized just as easily for transit about the trusses of the dual keel station. The MRMS is comprised of a mobile platform having a rail system formed of transversely disposed T-shaped tracks, which engage with guide pins located at the nodes of the trusses. The guide pins form a grid and the tracks are so designed as to permit travel in either of two orthogonal directions. The present invention provides a near-uniform traversing velocity with minimal dynamic loading on the system. Pivoting

changers move the platform from one face to another.

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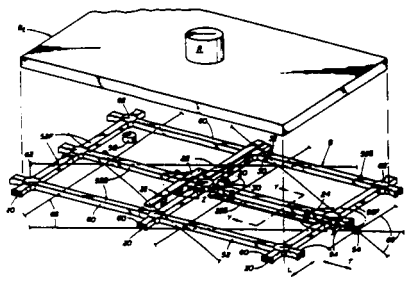

N88-28958* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EXPANDABLE PALLET FOR SPACE STATION INTERFACE ATTACHMENTS Patent

CLARENCE J. WESSELSKI, inventor (to NASA) 23 Aug. 1988 11 p Filed 13 Nov. 1986 Supersedes N87-18597 (25 - 11, p 1446)

(NASA-CASE-MSC-21117-1; US-PATENT-4,765,114; US-PATENT-APPL-SN-929875; US-PATENT-CLASS-52-646; US-PATENT-CLASS-52-648) Avail: US Patent and Trademark Office CSCL 22B

Described is a foldable expandable pallet for Space Station interface attachments with a basic square configuration. Each pallet consists of a series of struts joined together by node point fittings to make a rigid structure. The struts have hinge fittings which are spring loaded to permit collapse of the module for stowage transport to a Space Station in the payload bay of the Space Shuttle, and development on orbit. Dimensions of the pallet are selected to provide convenient, closely spaced attachment points between the node points of the relatively widely spaced trusses of a Space Station platform. A pallet is attached to a strut at four points: one close fitting hole, two oversize holes, and a slot to allow for thermal expansion/contraction and for manufacturing tolerances. Applications of the pallet include its use in rotary or angular joints; servicing of splints; with gridded plates; as instrument mounting bases; and as a roadbed for a Mobile Service Center (MSC).

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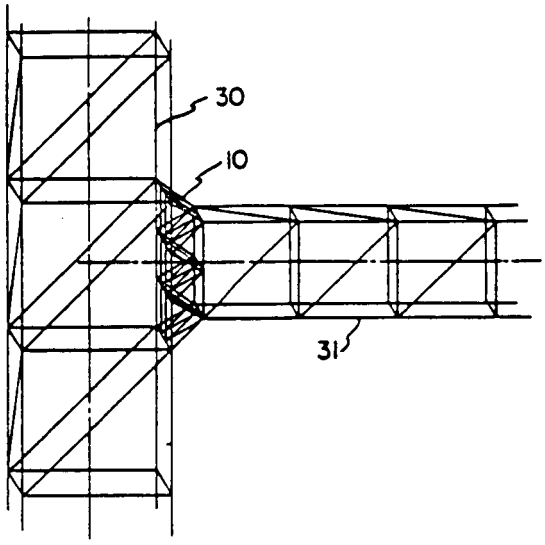


20

SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

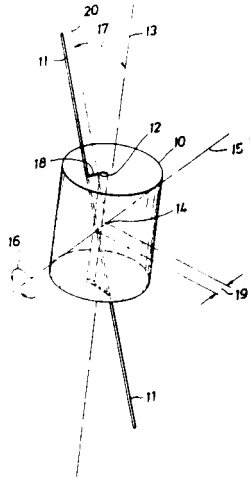
N88-24684*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

NOZZLE FABRICATION TECHNIQUE Patent Application

DENNIS L. WELLS, inventor (to NASA) 1 Apr. 1988 18 p (NASA-CASE-MSC-21299-1; NAS 1.71:MSC-21299-1; US-PATENT-APPL-SN-176587) Avail: NTIS HC A03/MF A01 CSCL 21H

This invention relates to techniques for fabricating hour glass throat or convergent divergent nozzle shapes, and more particularly to new and improved techniques for forming rocket nozzles from electrically conductive material and forming cooling channels in the wall thereof. The concept of positioning a block of electrically conductive material so that its axis is set at a predetermined skew angle with relation to a travelling electron discharge machine electrode and thereafter revolving the body about its own axis to generate a hyperbolic surface of revolution, either internal or external is novel. The method will generate a rocket nozzle which may be provided with cooling channels using the same control and positioning system. The configuration of the cooling channels so produced are unique and novel. Also the method is adaptable to nonmetallic material using analogous cutting tools, such as, water jet, laser, abrasive wire and hot wire.

NASA



N88-24685*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

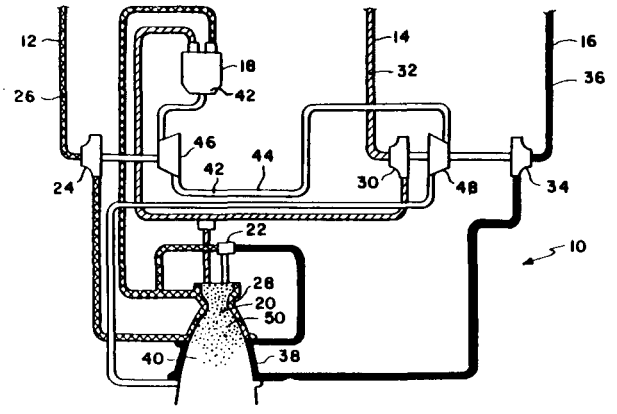
DUAL-FUEL, DUAL-MODE ROCKET ENGINE Patent Application

JAMES A. MARTIN, inventor (to NASA) 9 Mar. 1988 14 p (NASA-CASE-LAR-13773-1; NAS 1.71:LAR-13773-1; US-PATENT-APPL-SN-165946) Avail: NTIS HC A03/MF A01 CSCL 21H

The invention relates to a dual fuel, dual mode rocket engine designed to improve the performance of earth-to-orbit vehicles. For any vehicle that operates from the earth's surface to earth orbit, it is advantageous to use two different fuels during its ascent. A high density impulse fuel, such as kerosene, is most efficient during the first half of the trajectory. A high specific impulse fuel, such as hydrogen, is most efficient during the second half of the trajectory. The invention allows both fuels to be used with a single rocket engine. It does so by adding a minimum number of

state-of-the-art components to baseline single made rocket engines, and is therefore relatively easy to develop for near term applications. The novelty of this invention resides in the mixing of fuels before exhaust nozzle cooling. This allows all of the engine fuel to cool the exhaust nozzle, and allows the ratio of fuels used throughout the flight depend solely on performance requirements, not cooling requirements.

NASA



23

CHEMISTRY AND MATERIALS (GENERAL)

N88-24692* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AROMATIC CYCLOTRIPHOSPHAZENES Patent

DEVENDRA KAMAR, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.), GEORGE M. FOHLEN, inventor (to NASA), and JOHN A. PARKER, inventor (to NASA) 31 May 1988 20 p Filed 29 Oct. 1986 Division of US-Patent-Appl-SN-760374, Jul. 30, 1985. US-Patent-4,634,759, which is a division of US-Patent-Appl-SN-599126, Apr. 11, 1984, US-Patent-4,550,177 (NASA-CASE-ARC-11428-3; US-PATENT-4,748,263; US-PATENT-APPL-SN-924467; US-PATENT-CLASS-558-80; US-PATENT-CLASS-564-13; US-PATENT-APPL-SN-760374; US-PATENT-4,634,759; US-PATENT-APPL-SN-599126; US-PATENT-4,550,177) Avail: US Patent and Trademark Office CSCL 07A

Four-Aminophenoxy cyclotriphosphazenes are reacted with maleic anhydride to produce maleamic acids which are converted to the maleimides. The maleimides are polymerized. By selection of starting materials (e.g., hexakis amino or trisaminophenoxy trisphenoxy cyclotrisphosphazenes), selection of molar porportions of reactants, use of mixtures of anhydrides and use of dianhydrides as bridging groups a variety of maleimides and polymers are produced. The polymers have high limiting oxygen indices, high char yields and other useful heat and fire resistant properties making them useful as, for example, impregnants of fabrics.

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N88-26404* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SUBSTITUTED 1,1,1-TRIARYL-2,2,2-TRIFLUOROETHANES AND PROCESSES FOR THEIR SYNTHESIS Patent

WILLIAM B. ALSTON, inventor (to NASA) and ROY F. GRATZ, inventor (to NASA) 19 Jul. 1988 12 p Filed 29 Oct. 1986 Supersedes N87-14432 (25 - 06, p 0739) Sponsored by NASA (NASA-CASE-LEW-14345-1; US-PATENT-4,758,380; US-PATENT-APPL-SN-924474; US-PATENT-CLASS-260-389; US-PATENT-CLASS-260-386; US-PATENT-CLASS-260-395; US-PATENT-CLASS-549-241) Avail: US Patent and Trademark Office CSCL 07A

Synthetic procedures are described for tetraalkyls, tetraacids and dianhydrides substituted 1,1,1-triaryl-2,2,2-trifluoroethanes which comprises: (1) 1,1-bis(dialkylaryl)-1 aryl-2,2,2-trifluoroethane; (2) 1,1-bis(dicarboxyaryl)-1 aryl-2,2,2-trifluoroethane; or (3) cyclic dianhydride or diamine of 1,1-bis(dialkylaryl)-1 aryl-2,2,2,-trifluoroethanes.

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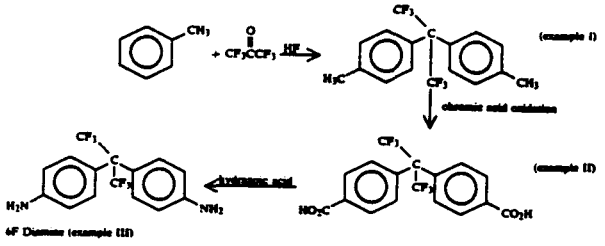


24

COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

N88-29888*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

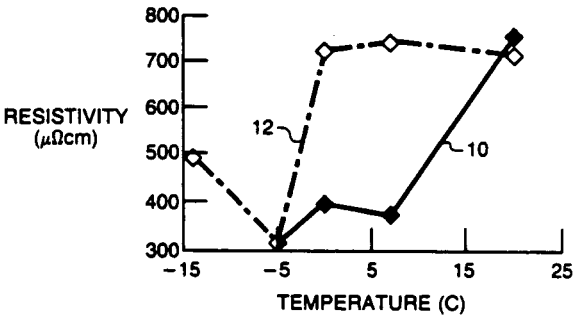
BROMINATED GRAPHITE FIBERS AND METHOD OF PRODUCING THE SAME Patent Application

CHING-CHEH HUNG, inventor (to NASA) 14 Jul. 1988 9 p (NASA-CASE-LEW-14698-1; NAS 1.71:LEW-14698-1; US-PATENT-APPL-SN-219016) Avail: NTIS HC A02/MF A01 CSCL 11D

Highly graphitized as well as commercially available less graphitized fibers are brominated in a relatively low temperature range. For liquid bromination, this range is between the melting point of bromine and room temperature. For vaporous bromination,

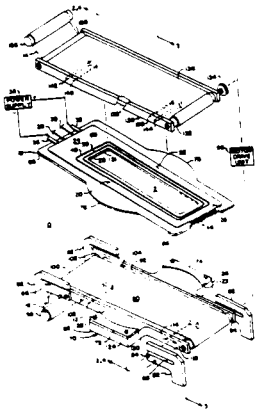
due to contamination of the belt material by the sample.

NASA



this range is between -15 C and 0 C. The brominated fibers are then reacted with fluorine.

Official Gazette of the U.S. Patent and Trademark Office



25

INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

N88-23845* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

MOVING WALL, CONTINUOUS FLOW ELECTRONPHORESIS APPARATUS Patent

PERCY H. RHODES, inventor (to NASA) and ROBERT S. SNYDER, inventor (to NASA) 21 Jun. 1988 10 p Filed 5 Sep. 1986 Supersedes N87-18627 (25 - 11, p 1451)
(NASA-CASE-MFS-28142-1; US-PATENT-4,752,372; US-PATENT-APPL-SN-904128; US-PATENT-CLASS-204-299-R; US-PATENT-CLASS-204-180.1) Avail: US Patent and Trademark Office CSCL 07D

This invention relates generally to electrophoresis devices and more particularly to a moving wall, continuous flow device in which an electrophoresis chamber is angularly positionable with respect to the direction of moving belt walls. A frame with an electrophoresis chamber is rotatably supported between two synchronously driven belt walls. This allows the chamber to be angularly positionable with respect to the direction of belt travel, which compensates for electroosmotic flow within the electrophoresis chamber. Injection of a buffer solution via an opening and a homogenous sample stream via another opening is performed at the end of a chamber, and collection of buffer and the fractionated species particles is done by a conventional collection array at an opposite end of the chamber. Belts are driven at a rate which exactly matches the flow of buffer and sample through the chamber, which entrains the buffer to behave as a rigid electrophoretic medium, eliminating flow distortions (Poiseuille effect). Additionally, belt material for each belt is stored at one end of the device and is taken up by drive wheels at an opposite end. The novelty of this invention particularly lies in the electrophoresis chamber being angularly positionable between two moving belt walls in order to compensate for electroosmotic flow. Additionally, new belt material is continuously exposed within the chamber, minimizing flow distortion

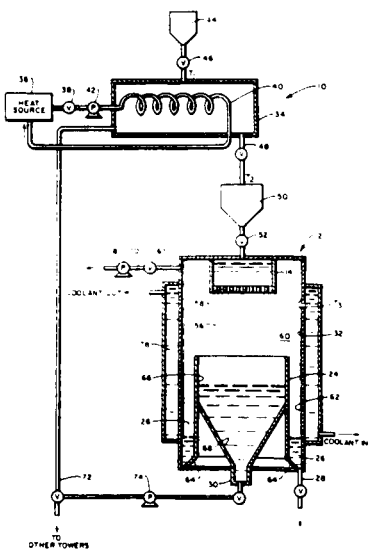
N88-23846* National Aeronautics and Space Administration. Pasadena Office, Calif.

METHOD OF EVAPORATION Patent

EUGENE R. DUFRESNE 19 May 1987 9 p Filed 30 Jul. 1985 Continuation of US-Patent-Appl-SN-511363, Jul. 6, 1983, abandoned
(NASA-CASE-NPO-15609-2; US-PATENT-4,666,561; US-PATENT-APPL-SN-761310; US-PATENT-CLASS-203-90; US-PATENT-CLASS-203-91; US-PATENT-CLASS-203-98; US-PATENT-CLASS-159-3; US-PATENT-CLASS-159-48.2; US-PATENT-CLASS-159-900; US-PATENT-APPL-SN-511363)
Avail: U.S. Patent and Trademark Office CSCL 07D

Liquids, such as juices, milk, molten metal and the like are concentrated by forming uniformly-sized, small droplets in a precision droplet forming assembly and deploying the droplets in free fall downwardly as a central column within an evacuated column with cool walls. A portion of the solvent evaporates. The vapor flows to the wall, condenses, and usually flows down the wall as a film to condensate collector and drain. The vertical column of freely falling droplets enters the splash guard. The condensate can be collected, sent to other towers or recycled.

Official Gazette of the U.S. Patent and Trademark Office



N88-24732* National Aeronautics and Space Administration. Pasadena Office, Calif.

ISOTOPE SEPARATION USING TUNED LASER AND ELECTRON BEAM Patent

SANDOR TRAJMAR, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 3 Nov. 1987 13 p Filed 13 Nov. 1986 Supersedes N87-18625 (25 - 11, p 1451)
(NASA-CASE-NPO-16907-1-CU; US-PATENT-4,704,197; US-PATENT-APPL-SN-930217; US-PATENT-CLASS-204-157.22; US-PATENT-CLASS-250-423-P; US-PATENT-CLASS-250-427)
Avail: US Patent and Trademark Office CSCL 07D

The apparatus comprises means for producing an atomic beam containing the isotope of interest and other isotopes. Means are provided for producing a magnetic field traversing the path of the atomic beam of an intensity sufficient to broaden the energy domain of the various individual magnetic sublevels of the isotope of interest and having the atomic beam passing therethrough. A laser beam is produced of a frequency and polarization selected to maximize the activation of only individual magnetic sublevels of the isotope of interest with the portion of its broadened energy domain most removed from other isotopes with the stream. The laser beam is directed so as to strike the atomic beam within the magnetic field and traverse the path of the atomic beam whereby only the isotope of interest is activated by the laser beam. The apparatus further includes means for producing a collimated and high intensity beam of electrons of narrow energy distribution within the magnetic field which is aimed so as to strike the atomic beam while the atomic beam is simultaneously struck by the laser beam and at an energy level selected to ionize the activated isotope of interest but not ground state species included therewith. Deflection means are disposed in the usual manner to collect the ions.

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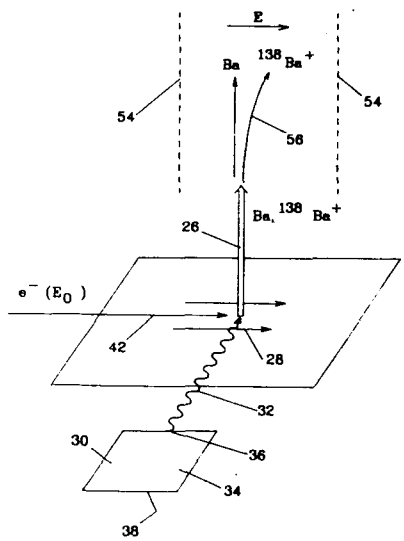


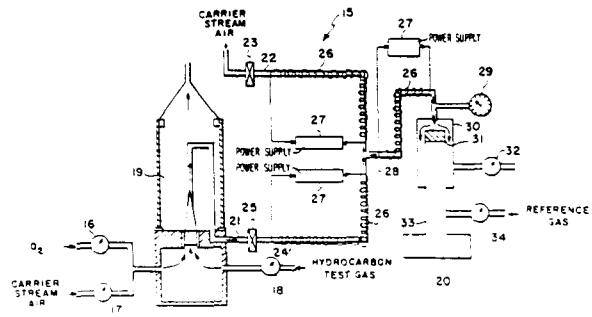
N88-29002* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD AND DEVICE FOR DETERMINING HEATS OF COMBUSTION OF GASEOUS HYDROCARBONS Patent

JAG J. SINGH, inventor (to NASA), DANNY R. SPRINKLE, inventor (to NASA), and RICHARD L. PUSTER, inventor (to NASA) 2 Aug. 1988 9 p Filed 24 Nov. 1986 Supersedes N87-18626 (25 - 11, p 1451)
(NASA-CASE-LAR-13528-1; US-PATENT-4,761,744; US-PATENT-APPL-SN-933962; US-PATENT-CLASS-364-500; US-PATENT-CLASS-236-15-E; US-PATENT-CLASS-364-557; US-PATENT-CLASS-364-571; US-PATENT-CLASS-374-36; US-PATENT-CLASS-431-13; US-PATENT-CLASS-431-76) Avail: US Patent and Trademark Office CSCL 21B

A method and device is provided for a quick, accurate and on-line determination of heats of combustion of gaseous hydrocarbons. First, the amount of oxygen in the carrier air stream is sensed by an oxygen sensing system. Second, three individual volumetric flow rates of oxygen, carrier stream air, and hydrocrabon test gas are introduced into a burner. The hydrocarbon test gas is fed into the burner at a volumetric flow rate, n, measured by a flowmeter. Third, the amount of oxygen in the resulting combustion products is sensed by an oxygen sensing system. Fourth, the volumetric flow rate of oxygen is adjusted until the amount of oxygen in the combustion product equals the amount of oxygen previously sensed in the carrier air stream. This equalizing volumetric flow rate is m and is measured by a flowmeter. The heat of combustion of the hydrocrabon test gas is then determined from the ratio m/n.

Official Gazette of the U.S. Patent and Trademark Office



26

METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N88-24753*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ALUMINUM ALLOY Patent Application

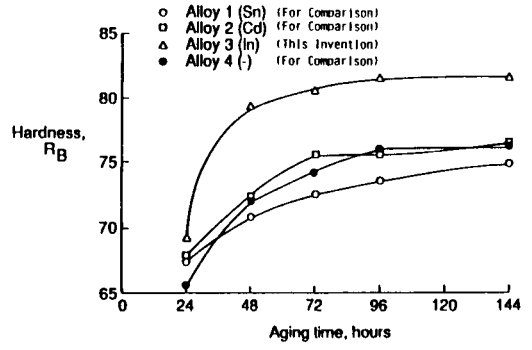
LINDA B. BLACKBURN, inventor (to NASA) and EDGAR A. STARKE, JR., inventor (to NASA) (Virginia Univ., Charlottesville.) 23 Mar. 1988 10 p
(NASA-CASE-LAR-13924-1-CU; NAS 1.71:LAR-13924-1-CU; US-PATENT-APPL-SN-172102) Avail: NTIS HC A02/MF A01 CSCL 11F

This invention relates to aluminum alloys, particularly to aluminum-copper-lithium alloys containing at least about 0.1 percent by weight of indium as an essential component, which are suitable for applications in aircraft and aerospace vehicles. At least about 0.1 percent by weight of indium is added as an essential component to an alloy which precipitates a T1 phase (Al2CuLi). This addition enhances the nucleation of the precipitate T1 phase, producing a microstructure which provides excellent strength as indicated by

Rockwell hardness values and confirmed by standard tensile tests.

NASA

Al-2.3Cu-2.3Li-0.15Zr-x ALLOYS AGED AT 160°C



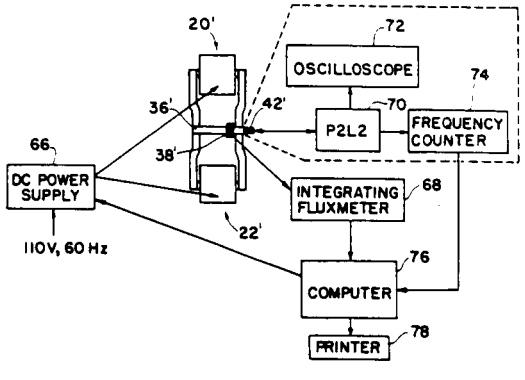
N88-29012*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD AND APPARATUS FOR NON-DESTRUCTIVE TESTING OF TEMPER EMBRITTLEMENT IN STEELS Patent Application

SIDNEY G. ALLISON, inventor (to NASA), NAMKUNG MIN, inventor (to NASA), WILLIAM T. YOST, inventor (to NASA), and JOHN H. CANTRELL, inventor (to NASA) 23 Jun. 1988 24 p
(NASA-CASE-LAR-13817-1; NAS 1.71:LAR-13817-1; US-PATENT-APPL-SN-210486) Avail: NTIS HC A03/MF A01 CSCL 11F

A method and apparatus for testing steel components for temper embrittlement uses magneto-acoustic emission to nondestructively evaluate the component. Acoustic emission signals occur more frequently at higher levels in embrittled components. A pair of electromagnets are used to create magnetic induction in the test component. Magneto-acoustic emission signals may be generated by applying an ac current to the electromagnets. The acoustic emission signals are analyzed to provide a comparison between a component known to be unembrittled and a test component. Magnetic remanence is determined by applying a dc current to the electromagnets, then turning the magnets off and observing the residual magnetic induction.

NASA



27

NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N88-23894* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

CELLULAR THERMOSETTING FLUOROPOLYMERS AND PROCESS FOR MAKING THEM Patent

SHENG Y. LEE 15 Mar. 1988 5 p Filed 29 May 1986 Supersedes N86-32570 (24 - 24, p 3710)
(NASA-CASE-GSC-13008-1; US-PATENT-4,731,211; US-PATENT-APPL-SN-867987; US-PATENT-CLASS-264-50; US-PATENT-CLASS-264-DIG.64; US-PATENT-CLASS-425-4-R) Avail: US Patent and Trademark Office CSCL 11B

Thermosetting fluoropolymer foams are made by mixing fluid from thermosetting fluoropolymer components having a substantial fluoride content, placing the mixture in a pressure tight chamber, filling the chamber with a gas, at a relatively low pressure, that is unreactive with the fluoropolymer components, allowing the mixture to gel, removing the gelled fluoropolymer from the chamber and therafter heating the fluoropolymer at a relatively low temperature to simultaneously cure and foam the fluoropolymer. The resulting fluoropolymer product is closed celled with the cells storing the gas employed for foaming. The fluoropolymer resins employed may be any thermosetting fluoropolymer including fluoroepoxies, fluoropolyurethanes and fluoroacrylates.

Official Gazette of the U.S. Patent and Trademark Office

N88-29040* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BORON-CONTAINING ORGANOSILANE POLYMERS AND CERAMIC MATERIALS THEREOF Patent

SALVATORE R. RICCITIELLO, inventor (to NASA), MING-TA S. HSU, inventor (to NASA), and TIMOTHY S. CHEN, inventor (to NASA) (HC Chem Research and Service, San Jose, Calif.) 30 Aug. 1988 10 p Filed 30 Jul. 1986 Supersedes N87-10205 (25 - 01, p 0035)
(NASA-CASE-ARC-11649-1-SB; US-PATENT-4,767,728; US-PATENT-APPL-SN-890577; US-PATENT-CLASS-501-91; US-PATENT-CLASS-501-88; US-PATENT-CLASS-501-92; US-PATENT-CLASS-501-93; US-PATENT-CLASS-528-4; US-PATENT-CLASS-528-10; US-PATENT-CLASS-528-30) Avail: US Patent and Trademark Office CSCL 11C

The present invention relates to organic silicon-boron polymers which upon pyrolysis produce high-temperature ceramic materials. More particularly, it relates to the polyorganoborosilanes containing -Si-B- bonds which generate high-temperature ceramic materials (e.g., SiC, SiB4, B4C) upon thermal degradation. The process for

preparing these organic silicon-boron polymer precursors are also part of the invention.

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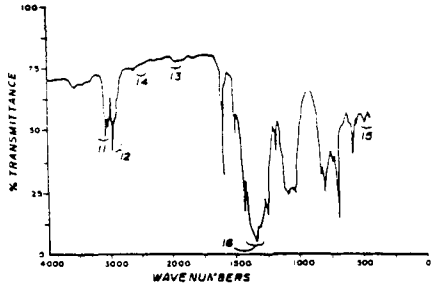


N88-29984*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NOVEL LADDER POLYMERS FOR USE AS HIGH TEMPERATURE STABLE RESINS OR COATINGS Patent Application

MARY ANN MEADOR, inventor (to NASA) 11 Aug. 1988 21 p (NASA-CASE-LEW-14203-1; NAS 1.71:LEW-14203-1; US-PATENT-APPL-SN-231026) Avail: NTIS HC A03/MF A01 CSCL 11C

An object of the invention is to synthesize a new class of ladder and partial ladder polymers. In accordance with the invention, the new class of ladder and partial ladder polymers are synthesized by polymerizing a bis-dienophile with a bis-diene. Another object of the invention is to provide a fabricated, electrically conducting, void free composite comprising the new class of the ladder and partial ladder polymers described above. The novelty of the invention relates to a new class of ladder and partial ladder polymers and a process for synthesizing these polymers. These polymers are soluble in common organic solvents and are characterized with a unique dehydration property at temperatures of 300 to 400 C to provide thermo-oxidatively stable pentiptycene units along the polymeric backbone. These polymers are further characterized with high softening points and good thermo-oxidative stability properties. Thus these polymers have potential as processable, matrix resins for high temperature composite applications.

NASA

29

MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

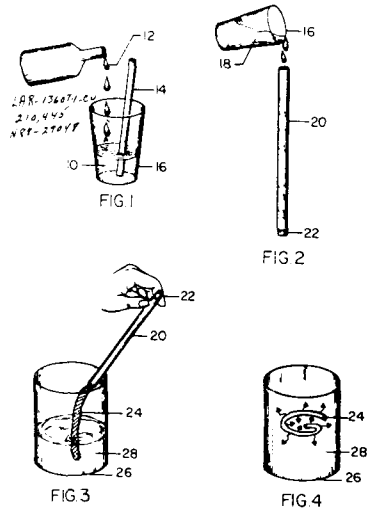
N88-29048*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD OF DISPENSING REAGENT CHEMICALS IN SPACE Patent Application

PATRICK G. BARBER, inventor (to NASA) (Longwood Coll., Farmville, Va.), JAMES H. COLEMAN, inventor (to NASA), and WILLIAM J. DEBNAM, inventor (to NASA) 23 Jun. 1988 13 p (NASA-CASE-LAR-13607-1-CU; NAS 1.71:LAR-13607-1-CU; US-PATENT-APPL-SN-210445) Avail: NTIS HC A03/MF A01 CSCL 22A

A procedure for the slow, controlled release of a reagent chemical in a reaction solution is described. A liquid gel is prepared, and a reagent chemical is added while the gel is still liquid. The gel solution thereby formed is poured into a storage container, and allowed to set. A desired amount of gel-tube is dispensed into a reaction solution, and the reagent chemical slowly diffuses out of the gel-tube.

NASA



31

ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

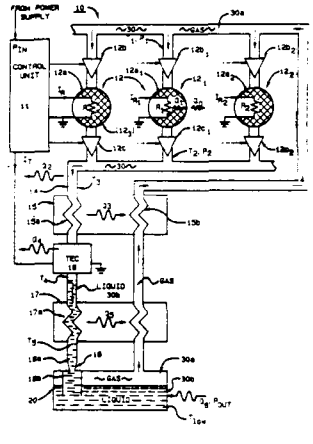
N88-23917*# National Aeronautics and Space Administration. Pasadena Office, Calif.

KRYPTON BASED ADSORPTION TYPE CRYOGENIC REFRIGERATOR Patent Application

JACK A. JONES, inventor (to NASA) and HELENE SCHEMBER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 1 Dec. 1987 26 p (Contract NAS7-918) (NASA-CASE-NPO-17334-1-CU; NAS 1.71:NPO-17334-1-CU; US-PATENT-APPL-SN-149821) Avail: NTIS HC A03/MF A01 CSCL 13B

Krypton and monolithic porous carbon such as Saran carbon are used respectively as the sorbate and sorbent of an absorption type refrigerator to improve refrigeration efficiency and operational longevity.

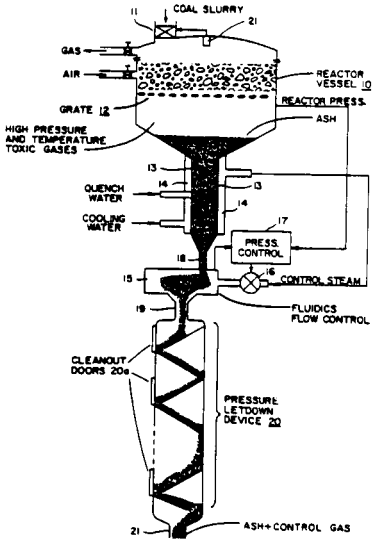
NASA



N88-24814*# National Aeronautics and Space Administration. Pasadena Office, Calif.
ENERGY EFFICIENT CONTINUOUS FLOW ASH LOCKHOPPER Patent Application
EARL R. COLLINS, JR., inventor (to NASA), JERRY W. SUITOR, inventor (to NASA), and DAVID DUBIS, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 16 Mar. 1988 19 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.
(Contract NAS7-918)
(NASA-CASE-NPO-16985-1-CU; NAS 1.71:NPO-16985-1-CU; US-PATENT-APPL-SN-195222) Avail: NTIS HC A03/MF A01 CSCL 13I

The invention relates to an energy efficient continuous flow ash lockhopper, or other lockhopper for reactor product or byproduct. The invention includes an ash hopper at the outlet of a high temperature, high pressure reactor vessel containing heated high pressure gas, a fluidics control chamber having an input port connected to the ash hopper's output port and an output port connected to the input port of a pressure letdown means, and a control fluid supply for regulating the pressure in the control chamber to be equal to or greater than the internal gas pressure of the reactor vessel, whereby the reactor gas is contained while ash is permitted to continuously flow from the ash hopper's output port, impelled by gravity. The main novelty resides in the use of a control chamber to so control pressure under the lockhopper that gases will not exit from the reactor vessel, and to also regulate the ash flow rate. There is also novelty in the design of the ash lockhopper shown in two figures. The novelty there is the use of annular passages of progressively greater diameter, and rotating the center parts on a shaft, with the center part of each slightly offset from adjacent ones to better assure ash flow through the opening.

NASA



N88-24815*# National Aeronautics and Space Administration. Pasadena Office, Calif.
TOWER EVAPORATOR Patent Application
EUGENE R. DUFRESNE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 19 Apr. 1983 28 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.
(Contract NAS7-100)
(NASA-CASE-NPO-15609-2; NAS 1.71:NPO-15609-2; US-PATENT-APPL-SN-761310) Avail: NTIS HC A03/MF A01 CSCL 13B

Liquids, such as juices, milk, molten metal, and the like are concentrated by forming uniformly-sized small droplets in a precision droplet forming assembly and deploying the droplets in free fall downwardly as a central column within an evacuated tower having cool walls. A portion of the solvent evaporates. The vapor flows to the wall, condenses, and usually flows down the wall as a film to the condensate collector and drain. (In special cases, the condensate may be frozen on the wall, and stripped from it as a solid). The vertical column of freely-falling droplets enters the splash guard. The condensate can be collected, sent to other towers or recycled.

NASA

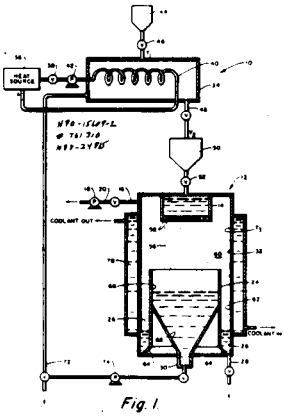
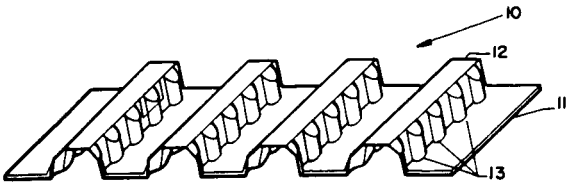


Fig. 1.

N88-24816*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STIFFENED TITANIUM PANELS Patent Application
RANDALL C. DAVIS, inventor (to NASA), THOMAS T. BALES, inventor (to NASA), and DICK M. ROYSTER, inventor (to NASA) 2 Feb. 1988 12 p
(NASA-CASE-LAR-13814-1; NAS 1.71:LAR-13814-1; US-PATENT-APPL-SN-151678) Avail: NTIS HC A03/MF A01 CSCL 13B

The invention is a reinforced, stiffened titanium panel having corrugations with beaded reinforcement in the corrugation sidewalls. The method for molding these complex structural shapes is also a part of the invention. The technique developed to form the panels of this invention involve raising the temperature of the titanium plate to a temperature which permits plastic flow of the metal. The metal is then blown into a female mold using evacuation of the mold and overpressure on the opposite side of the titanium sheet. Using this method, the titanium can be stretched and elongated in much the same manner as glass is blown. Shapes which are impractical by conventional means can be easily achieved. The structural shapes formed in the present invention increase the structural efficiency of the panels. With no increase in weight, the stiffness and resistance of molding these shapes using superplastic forming techniques.

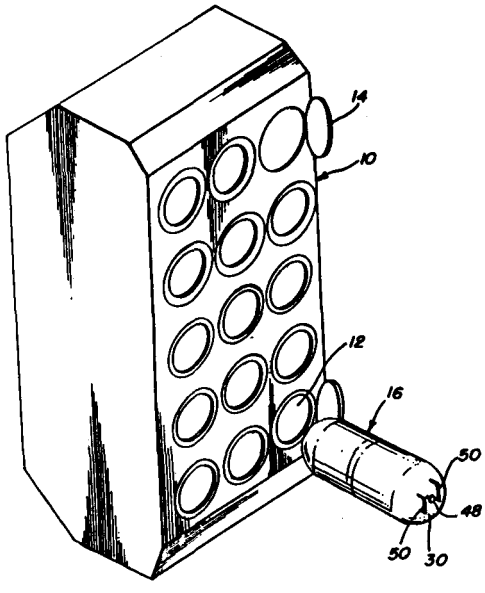
NASA



N88-24817*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LOW TEMPERATURE STORAGE CONTAINER FOR TRANSPORTING PERISHABLES TO SPACE STATION Patent Application
WILLIAM G DEAN, inventor (to NASA) (Lockheed Missiles and Space Co., Huntsville, Ala.) and JAMES W. OWEN, inventor (to NASA) 1 Apr. 1988 17 p
(NASA-CASE-MFS-28248-1; NAS 1.71:MFS-28248-1; US-PATENT-APPL-SN-176545) Avail: NTIS HC A03/MF A01 CSCL 13B

This invention is directed to the long term storage of frozen and refrigerated food and biological samples by the space shuttle to the space station. A storage container is utilized which has a passive system so that fluid/thermal and electrical interfaces with the logistics module is not required. The container for storage comprises two units, each having an inner storage shell and an outer shell receiving the inner shell and spaced about it. The novelty appears to lie in the integration of thermally efficient cryogenic storage techniques with phase change materials, including the multilayer metalized surface thin plastic film insulation and the vacuum between the shells. Additionally the fiberglass constructed shells having fiberglass honeycomb portions, and the lining of the space between the shells with foil combine to form a storage container which may keep food and biological samples at very low temperatures for very long periods of time utilizing a passive system.

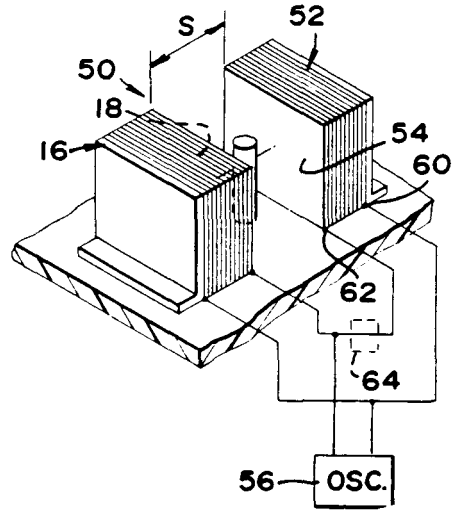
NASA



N88-24818*# National Aeronautics and Space Administration. Pasadena Office, Calif.
ACOUSTIC CONVECTIVE SYSTEM Patent Application
EUGENE H. TRINH, inventor (to NASA) and JUDITH L. ROBEY, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 3 Feb. 1988 11 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.
(Contract NAS7-918)
(NASA-CASE-NPO-17278-1-CU; NAS 1.71:NPO-17278-1-CU; US-PATENT-APPL-SN-172100) Avail: NTIS HC A03/MF A01 CSCL 13B

A small and simple system is provided for cooling or heating a small component by flowing air or other fluid over it, which does not require any macroscopic moving parts. The system includes a transducer and reflector that are spaced apart with the component between them, and with the transducer being operated at a frequency resonant to the spacing between it and the reflector. The resulting standing wave pattern produces acoustic streaming which results in the circulating of air or other fluid in the environment across the component. The system is especially useful in the reduced gravity environment of outer space because of the absence of any buoyancy-induced convection there.

NASA

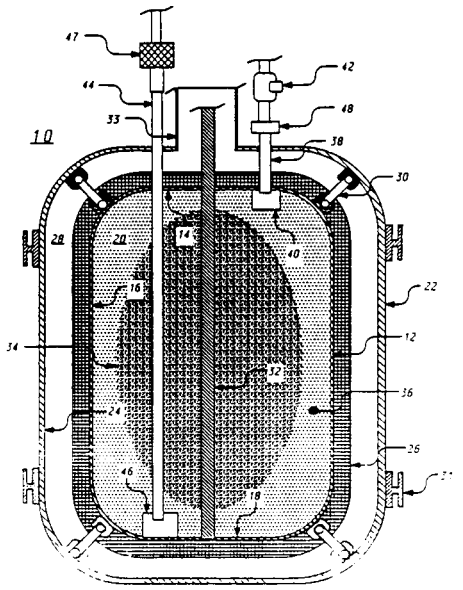


N88-29050*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SURFACE TENSION CONFINED LIQUID CRYOGEN COOLER (STCLCC) Patent Application
STEPHEN H. CASTLES, inventor (to NASA) and MICHAEL E. SCHEIN, inventor (to NASA) 13 Jun. 1988 9 p
(NASA-CASE-GSC-13112-1; NAS 1.71:GSC-13112-1; US-PATENT-APPL-SN-205771) Avail: NTIS HC A02/MF A01 CSCL 13B

A cryogenic cooler is provided for use in craft such as launch, orbital, and space vehicles subject to substantial vibration, changes in orientation, and weightlessness. The cooler contains a small pore, large free volume, low density material to restrain a cryogen through surface tension effects during launch and zero-g operations and maintains instrumentation within the temperature range of 10

to 140 K. The cooler operation is completely passive, with no inherent vibration or power requirements.

NASA



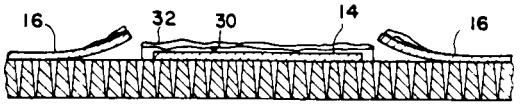
N88-29051*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD FOR MAINTAINING PRECISE SUCTION STRIP POROSITIES Patent Application

FRANK H. GALLIMORE, inventor (to NASA) (McDonnell-Douglas Corp., Huntington Beach, Calif.) 22 Jul. 1988 21 p (NASA-CASE-LAR-13638-1; NAS 1.71:LAR-13638-1; US-PATENT-APPL-SN-223124) Avail: NTIS HC A03/MF A01 CSCL 13B

This invention relates to a masking method generally and, more particularly to a method of masking perforated titanium sheets having laminar control suction strips. As illustrated in the drawings, a nonaerodynamic surface of a perforated sheet has alternating suction strip areas and bonding land areas. Suction strip tapes overlie the bonding land areas during application of a masking material to an upper surface of the suction strip tapes. Prior to bonding the perforated sheet to a composite structure, the bonding land tapes are removed. The entire opposite aerodynamic surface is masked with tape before bonding. This invention provides a precise control of suction strip porosities by ensuring that no chemicals penetrate the suction strip areas during bonding.

FIG. 2c



N88-29052* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD OF FORMING DYNAMIC MEMBRANE ON STAINLESS STEEL SUPPORT Patent

JOSEPH L. GADDIS, inventor (to NASA) and CRAIG A. BRANDON, inventor (to NASA) (Clemson Univ., S.C.) 9 Aug. 1988 5 p Filed Aug. 19, 1986 Continuation of US-Patent-Appl-SN-755960, filed 17 Jul. 1985, abandoned, which is a continuation of US-Patent-Appl-SN-119334, filed 7 Feb. 1980, abandoned (NASA-CASE-MSC-18172-3; US-PATENT-4,762,619; US-PATENT-APPL-SN-898449; US-PATENT-CLASS-210-639; US-PATENT-CLASS-210-653; US-PATENT-CLASS-210-500.25; US-PATENT-CLASS-210-500.35; US-PATENT-CLASS-427-245; US-PATENT-APPL-SN-755960; US-PATENT-APPL-SN-119334) Avail: US Patent and Trademark Office CSCL 13H

A suitable member formed from sintered, powdered, stainless steel is contacted with a nitrate solution of a soluble alkali metal nitrate and a metal such as zirconium in a pH range and for a time sufficient to effect the formation of a membrane of zirconium oxide preferably including an organic polymeric material such as polyacrylic acid.

Official Gazette of the U.S. Patent and Trademark Office

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COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

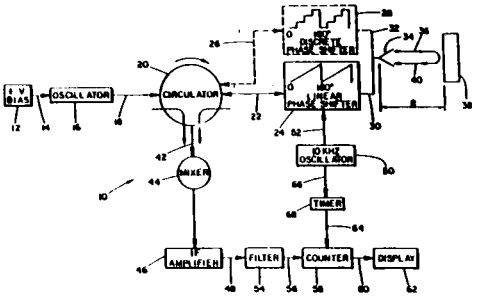
N88-23923*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

DOPPLER RADAR WITH MULTIPHASE MODULATION OF TRANSMITTED AND REFLECTED SIGNAL Patent Application

PAUL W. SHORES, inventor (to NASA), JOHN W. GRIFFIN, inventor (to NASA), and HEBERT KOBAYASHI, inventor (to NASA) 25 Nov. 1987 16 p (NASA-CASE-MSC-18808-1; NAS 1.71:MSC-18808-1) Avail: NTIS HC A03/MF A01 CSCL 17I

A microwave radar signal is generated and split by a circulator. A phase shifter introduces a series of phase shifts into a first part of the split signal which is then transmitted by antenna. A like number of phase shifts is introduced by the phase shifter into the return signal from the target. The circulator delivers the phase shifted return signal and the leakage signal from the circulator to a mixer which generates an IF signal output at the Doppler frequency. The IF signal is amplified, filtered, counted per unit of time, and the result displayed to provide indications of target sense and range rate. An oscillator controls rate of phase shift in the transmitted and received radar signals and provides a time base for the counter. The phase shift magnitude increases may be continuous and linear or discrete functions of time.

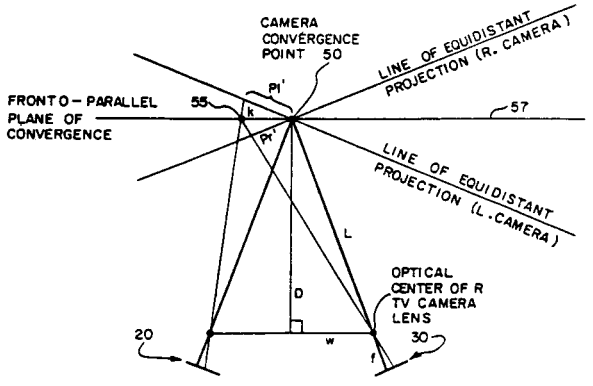
NASA



N88-23924*# National Aeronautics and Space Administration. Pasadena Office, Calif.
TELEVISION MONITOR FIELD SHIFTER AND AN OPTO-ELECTRONIC METHOD FOR OBTAINING A STEREO IMAGE OF OPTIMAL DEPTH RESOLUTION AND REDUCED DEPTH DISTROTION ON A SINGLE SCREEN Patent Application
DANIEL B. DINER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 25 Nov. 1987 40 p
(Contract NAS7-918)
(NASA-CASE-NPO-17249-1-CU; NAS 1.71:NPO-17249-1-CU; US-PATENT-APPL-SN-125666) Avail: NTIS HC A03/MF A01 CSCL 17B

A method and apparatus is developed for obtaining a stereo image with reduced depth distortion and optimum depth resolution. Static and dynamic depth distortion and depth resolution tradeoff is provided. Cameras obtaining the images for a stereo view are converged at a convergence point behind the object to be presented in the image, and the collection-surface-to-object distance, the camera separation distance, and the focal lengths of zoom lenses for the cameras are all increased. Doubling the distances cuts the static depth distortion in half while maintaining image size and depth resolution. Dynamic depth distortion is minimized by panning a stereo view-collecting camera system about a circle which passes through the convergence point and the camera's first nodal points. Horizontal field shifting of the television fields on a television monitor brings both the monitor and the stereo views within the viewer's limit of binocular fusion.

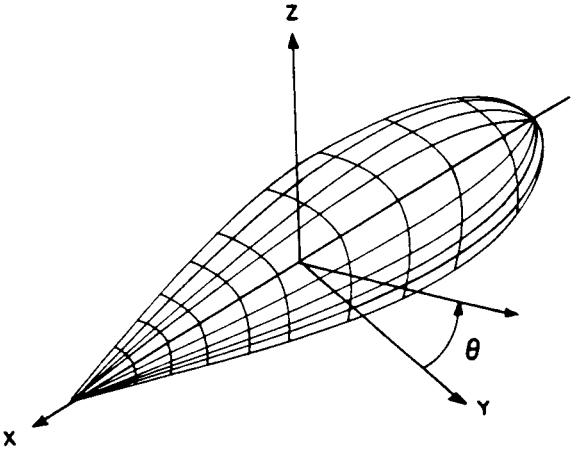
NASA



N88-24845*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ALMOND TEST BODY Patent Application
ALLEN K. DOMINEK, inventor (to NASA) (Ohio State Univ., Columbus.), RICHARD M. WOOD, inventor (to NASA), and MELVIN C. GILREATH, inventor (to NASA) 23 May 1988 9 p Prepared in cooperation with Ohio State Univ., Columbus
(NASA-CASE-LAR-13747-1; NAS 1.71:LAR-13747-1; US-PATENT-APPL-SN-197191) Avail: HC A02/MF A01 CSCL 20N

The invention is an almond shaped test body for use in measuring the performance characteristics of microwave anechoic chambers and for use as a support for components undergoing radar cross-section measurements. The novel aspect of this invention is its shape, which produces a large dynamic scattered field over large angular regions making the almond valuable for verifying the performance of microwave anechoic chambers. As a component mount, the almond exhibits a low return that does not perturb the measurement of the component and it simulates the backscatter characteristics of the component as if over an infinite ground plane.

NASA

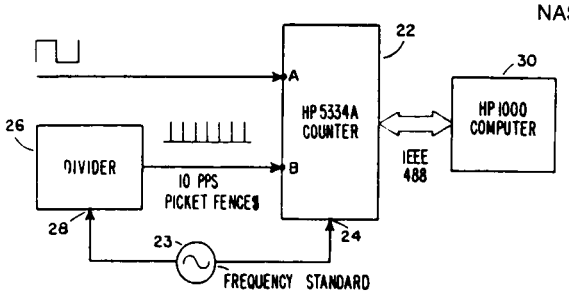


N88-24846*# National Aeronautics and Space Administration. Pasadena Office, Calif.
APPARATUS FOR USING A TIME INTERVAL COUNTER TO MEASURE FREQUENCY STABILITY Patent Application
CHARLES A. GREENHALL, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 11 Feb. 1988 16 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.
(Contract NAS7-918)
(NASA-CASE-NPO-17325-1-CU; NAS 1.71:NPO-17325-1-CU; US-PATENT-APPL-SN-184235) Avail: NTIS HC A03/MF A01 CSCL 20N

An apparatus for measuring the relative stability of two signals is disclosed comprising a means for mixing the two signals down to a beat note sine wave and for producing a beat note square wave whose upcrossings are the same as the sine wave. A source of reference frequency is supplied to a clock divider and interval counter to synchronize them and to generate a picket fence for providing a time reference grid of period shorter than the beat period. An interval counter is employed to make a preliminary measurement between successive upcrossings of the beat note square wave for providing an approximate time interval therebetween as a reference. The beat note square wave and the picket fence are then provided to the interval counter to provide an output consisting of the time difference between the upcrossing of each beat note square wave cycle and the next picket fence pulse such that the counter is ready for each upcrossing and dead time is avoided. A computer containing an algorithm for

calculating the exact times of the beat note upcrossings then computes the upcrossing times.

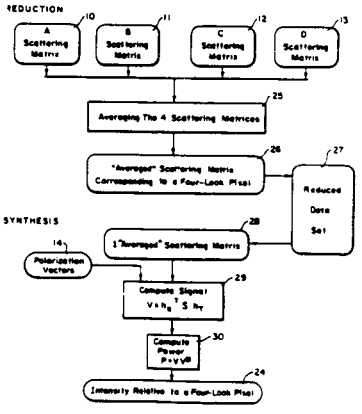
NASA



N88-26541*# National Aeronautics and Space Administration. Pasadena Office, Calif.
DATA VOLUME REDUCTION FOR IMAGING RADAR POLARIMETRY Patent Application
HOWARD A. ZEBKER, inventor (to NASA), DANIEL N. HELD, inventor (to NASA), JAKOB J. VANZYL, inventor (to NASA), PASCALE C. DUBOIS, inventor (to NASA), and LYNNE NORIKANE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 5 Apr. 1988 26 p
(Contract NAS7-918)
(NASA-CASE-NPO-17184-1-CU; NAS 1.71:NPO-17184-1-CU; US-PATENT-APPL-SN-195225) Avail: NTIS HC A03/MF A01 CSCL 17I

Two alternative methods are presented for digital reduction of synthetic aperture multipolarized radar data using scattering matrices, or using Stokes matrices, of four consecutive along-track pixels to produce averaged data for generating a synthetic polarization image.

NASA



N88-26568* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD AND APPARATUS FOR MEASURING DISTANCE Patent
CHRISTOPHER L. LICHTENBERG, inventor (to NASA), PAUL W. SHORES, inventor (to NASA), and HERBERT S. KOBAYASHI, inventor (to NASA) 12 Jul. 1988 14 p Filed 20 Feb. 1986 Supersedes N86-24879 (24 - 15, p 2445) Sponsored by NASA
(NASA-CASE-MSC-20912-1; US-PATENT-4,757,315; US-PATENT-APPL-SN-831193; US-PATENT-CLASS-342-125; US-PATENT-CLASS-342-43; US-PATENT-CLASS-342-51; US-PATENT-CLASS-342-127) Avail: US Patent and Trademark Office CSCL 17I

The invention employs a continuous wave radar technique and apparatus which can be used as a distance measuring system in the presence of background clutter by utilizing small passive transponders. A first continuous electromagnetic wave signal S sub 1 at a first frequency f sub 1 is transmitted from a first location. A transponder carried by a target object positioned at a second (remote) location receives the transmitted signal, phase-coherently divides the f sub 1 frequency and its phase, and re-transmits the transmitted signal as a second continuous electromagnetic wave signal S sub 2 at a lower frequency f sub 2 which is a subharmonic of f sub 1. The re-transmitted signal is received at the first location where a measurement of the phase difference is made between the signals S sub 1 and S sub 2, such measuremnt being indicative of the distance between the first and second locations.

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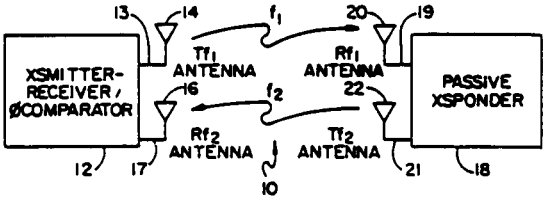

N88-29076* National Aeronautics and Space Administration. Pasadena Office, Calif.
DIGITAL PHASE-LOCK LOOP HAVING AN ESTIMATOR AND PREDICTOR OF ERROR Patent
JOSEPH I. STATMAN, inventor (to NASA) and WILLIAM J. HURD, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 13 Sep. 1988 17 p Filed Aug. 13, 1987
(NASA-CASE-NPO-17196-1-CU; US-PATENT-4,771,250; US-PATENT-APPL-SN-084770; US-PATENT-CLASS-331-17; US-PATENT-CLASS-331-25; US-PATENT-CLASS-328-155)
Avail: US Patent and Trademark Office CSCL 17B

A digital phase-lock loop (DPLL) which generates a signal with a phase that approximates the phase of a received signal with a linear estimator. The effect of a complication associated with non-zero transport delays related to DPLL mechanization is then compensated by a predictor. The estimator provides recursive estimates of phase, frequency, and higher order derivatives, while the predictor compensates for transport lag inherent in the loop.

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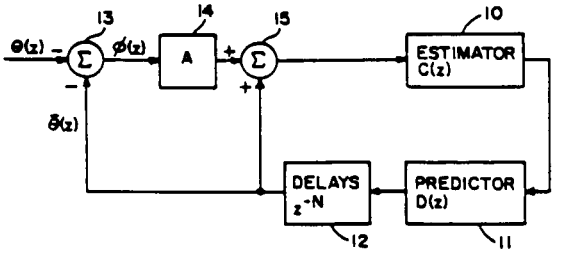
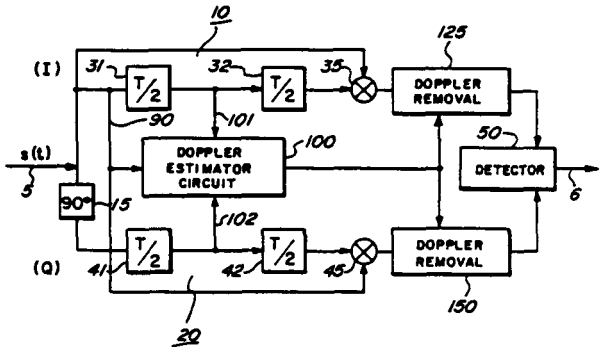


N88-30001*# National Aeronautics and Space Administration. Pasadena Office, Calif.
DOPPLER-CORRECTED DIFFERENTIAL DETECTION SYSTEM Patent Application
MARVIN K. SIMON, inventor (to NASA) and DARIUSH DIVSALAR, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 31 May 1988 55 p
(Contract NAS7-918)
(NASA-CASE-NPO-16987-1-CU; NAS 1.71:NPO-16987-1-CU; US-PATENT-APPL-SN-203376) Avail: NTIS HC A04/MF A01 CSCL 20N

Doppler in a communication system operating with a multiple differential phase-shift-keyed format (MDPSK) creates an adverse

phase shift in an incoming signal. An open loop frequency estimation is derived from a Doppler-contaminated incoming signal. Based upon the recognition that, whereas the change in phase of the received signal over a full symbol contains both the differentially encoded data and the Doppler induced phase shift, the same change in phase over half a symbol (within a given symbol interval) contains only the Doppler induced phase shift, and the Doppler effect can be estimated and removed from the incoming signal. Doppler correction occurs prior to the receiver's final output of decoded data. A multiphase system can operate with two samplings per symbol interval at no penalty in signal-to-noise ratio provided that an ideal low pass pre-detection filter is employed, and two samples, at 1/4 and 3/4 of the symbol interval T sub s, are taken and summed together prior to incoming signal data detection.

NASA



33

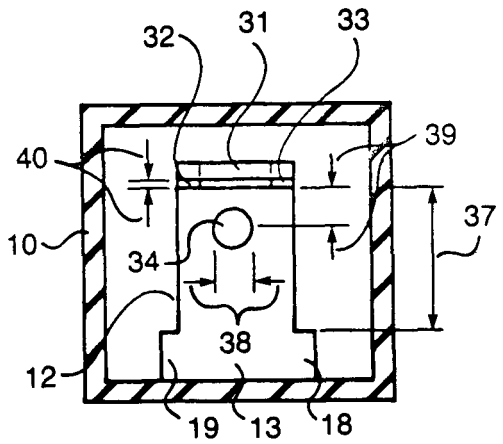
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

N88-23936*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MINIATURE TRAVELING WAVE TUBE AND METHOD OF MAKING Patent Application
HENRY G. KOSMAHL 8 Dec. 1987 15 p
(NASA-CASE-LEW-14520-1; NAS 1.71:LEW-14520-1; US-PATENT-APPL-SN-130058) Avail: NTIS H A03/MF A01
CSCL 09A

A miniature traveling wave tube is provided which will have most of the advantages of solid state circuitry but with higher efficiency and without being highly sensitive to temperature and various types of electromagnetic radiation and subatomic particles as are solid state devices. The traveling wave tube is about 2.5 cm in length and includes a slow wave circuit (SWS) comprised of apertured fins with a top cover which is insulated from the fins by strips or rungs of electrically insulating, dielectric material. An extemely small SWS is constructed by employing various grooving and etching methods, and by providing insulating strips or rungs by various deposition and masking techniques.

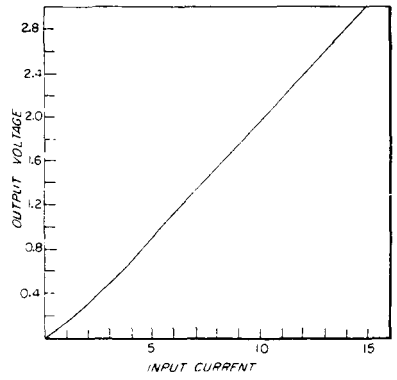
NASA



N88-23937*# National Aeronautics and Space Administration. Pasadena Office, Calif.
LOW POWER CONSUMPTION CURRENT TRANSDUCER Patent Application
W. T. MCLYMAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 15 Dec. 1976 14 p
(Contract NAS7-918)
(NASA-CASE-NPO-16888-1-CU; NAS 1.71:NPO-16888-1-CU; US-PATENT-APPL-SN-133412) Avail: NTIS HC A03/MF A01
CSCL 09A

A low power consumption current transducer utilizes a saturable core reactor which includes a pair of opposed gate windings and a control winding. The control winding of the saturable reactor is arranged to receive the current to be measured. A square wave generator is connected to the gate winding of the transformer connected across the square wave generator and the secondary connected in series with the gate windings of the reactor. A full wave rectifier is connected to the gate windings and a resistor is connected across the rectifier to provide a DC voltage to cross it representative of the current flow through the control winding. A DC power supply is provided to supply power to the square wave voltage source. A diode is connected between each end of the primary winding of the transformer and one polarity of the DC power supply to commutate the reactive current resulting from the counter emf generated in the reactor back to the DC supply to eliminate potentially damaging reactive voltage spikes which would otherwise appear at the output of the square wave generator and conserve energy.

NASA



N88-23941* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HERMETICALLY SEALABLE PACKAGE FOR HYBRID SOLID-STATE ELECTRONIC DEVICES AND THE LIKE Patent
WILSON N. MILLER, inventor (to NASA) (Rockwell International Corp., Anaheim, Calif.) and ORMAL E. GRAY, inventor (to NASA) 7 Jun. 1988 7 p Filed 25 Jun. 1982 Supersedes N82-28549 (20 - 19, p 2680)
(NASA-CASE-MSC-20181-1; US-PATENT-4,750,031; US-PATENT-APPL-SN-392093; US-PATENT-CLASS-357-81; US-PATENT-CLASS-357-72; US-PATENT-CLASS-357-74; US-PATENT-CLASS-174-52-S; US-PATENT-CLASS-174-52-PE; US-PATENT-CLASS-174-52-R; US-PATENT-CLASS-525-425)
Avail: US Patent and Trademark Office CSCL 09A

A light-weight, inexpensively fabricated, hermetically sealable, repairable package for small electronic or electromechanical units, having multiple connections, is described. A molded ring frame of polyamide-imide plastic (Torlon) is attached along one edge to a base plate formed of a highly heat conducting material, such as aluminum or copper. Bores are placed through a base plate within the area of the edge surface of ring frame which result in an attachment of the ring frame to the base plate during molding. Electrical leads are molded into the ring frame. The leads are L-shaped gold-plated copper wires imbedded within widened portions of the side wall of the ring frame. Within the plastic ring frame wall the leads are bent (typically, though not necessarily at 90 deg) so that they project into the interior volume of the ring frame for connection to the solid state devices.

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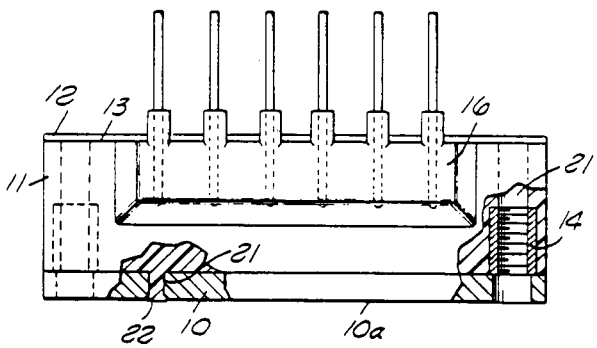

N88-23942* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ARC LAMP POWER SUPPLY USING A VOLTAGE MULTIPLIER Patent
BRADLEY D. LEIGHTY 2 Feb. 1988 6 p Filed 27 Jun. 1986 Supersedes N86-32626 (24 - 24, P 3719)
(NASA-CASE-LAR-13202-1; US-PATENT-4,723,096; US-PATENT-APPL-SN-879758; US-PATENT-CLASS-315-254; US-PATENT-CLASS-315-276; US-PATENT-CLASS-315-277; US-PATENT-CLASS-315-255; US-PATENT-CLASS-315-200-R; US-PATENT-CLASS-315-227-R; US-PATENT-CLASS-315-241-R)
Avail: US Patent and Trademark Office CSCL 09A

A power supply is provided for an arc discharge lamp which includes a relatively low voltage high current power supply section and a high voltage starter circuit. The low voltage section includes a transformer, rectifier, variable resistor and a bank of capacitors, while the starter circuit comprises several diodes and capacitors connected as a Cockcroft-Walton multiplier. The starting circuit is effectively bypassed when the lamp arc is established and serves to automatically provide a high starting voltage to re-strike the lamp arc if the arc is extinguished by a power interruption.

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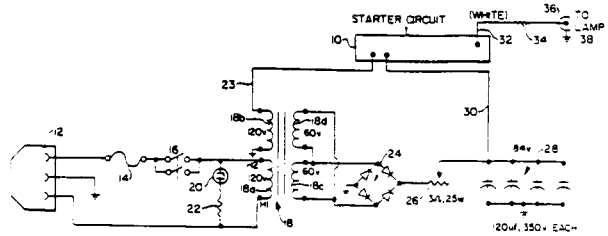

N88-24862* National Aeronautics and Space Administration. Pasadena Office, Calif.
MAGNETICALLY SWITCHED POWER SUPPLY SYSTEM FOR LASERS Patent
THOMAS J. PACALA, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 6 Oct. 1987 12 p Filed 12 Feb. 1987 Continuation of US-Patent-Appl-SN-727931, Apr. 29, 1985, abandoned
(NASA-CASE-NPO-16402-2; US-PATENT-4,698,518; US-PATENT-APPL-SN-013803; US-PATENT-CLASS-307-106; US-PATENT-CLASS-328-67; US-PATENT-CLASS-315-172; US-PATENT-CLASS-315-173; US-PATENT-APPL-SN-727931)
Avail: US Patent and Trademark Office CSCL 09A

A laser power supply system is described in which separate pulses are utilized to avalanche ionize the gas within the laser and then produce a sustained discharge to cause the gas to emit light energy. A pulsed voltage source is used to charge a storage device such as a distributed capacitance. A transmission line or other suitable electrical conductor connects the storage device to the laser. A saturable inductor switch is coupled in the transmission line for containing the energy within the storage device until the voltage level across the storage device reaches a predetermined level, which level is less than that required to avalanche ionize the gas. An avalanche ionization pulse generating circuit is coupled to the laser for generating a high voltage pulse of sufficient amplitude to avalanche ionize the laser gas. Once the laser gas is avalanche ionized, the energy within the storage device is discharged through the saturable inductor switch into the laser to provide the sustained discharge. The avalanche ionization generating circuit may include a separate voltage source which is connected across the laser or may be in the form of a voltage multiplier circuit connected between the storage device and the laser.

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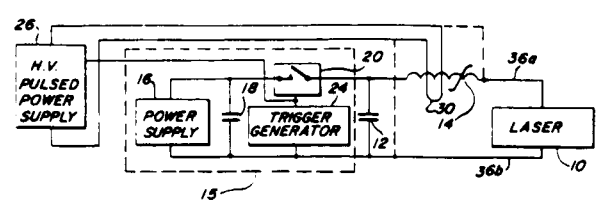


N88-24863*# National Aeronautics and Space Administration. Pasadena Office, Calif.

TIMING CONTROL SYSTEM Patent Application

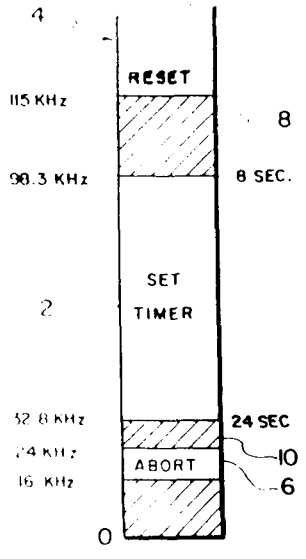
GORDON A. WIKER, inventor (to NASA) and GEORGE H. WELLS, JR., inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Sep. 1987 30 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-16882-1-CU; NAS 1.71:NPO-16882-1-CU; US-PATENT-APPL-SN-154711) Avail: NTIS HC A03/MF A01 CSCL 09A

A timing control system is disclosed which is particularly useful in connection with simulated mortar shells. Special circuitry is provided to assure that the shell does not over shoot, but rather detonates early in case of an improper condition; this ensures that ground personnel will not be harmed by a delayed detonation. The system responds to an externally applied frequency control code which is configured to avoid any confusion between different control modes. A premature detonation routine is entered in case an improper time-setting signal is entered, or if the shell is launched before completion of the time-setting sequence. Special provisions are also made for very early launch situations and improper detonator connections. An alternate abort mode is provided to discharge the internal power supply without a detonation in a manner that can be externally monitored, thereby providing a mechanism for non-destructive testing. The abort mode also accelerates the timing function for rapid testing.

NASA



N88-24864*# National Aeronautics and Space Administration. Pasadena Office, Calif.

A UNIVERSAL COMPUTER CONTROL SYSTEM FOR MOTORS Patent Application

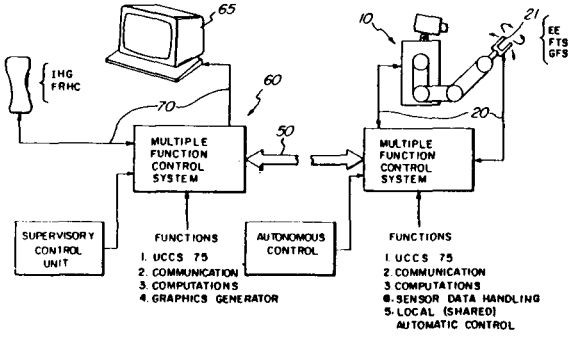
ZOLTAN F. SZAKALY, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Mar. 1988 34 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-17134-1-CU; NAS 1.71:NPO-17134-1-CU; US-PATENT-APPL-SN-172105) Avail: NTIS HC A03/MF A01 CSCL 09A

A control system for a multi-motor system such as a space telerobot, having a remote computational node and a local computational node interconnected with one another by a high speed data link is described. A Universal Computer Control System (UCCS) for the telerobot is located at each node. Each node is provided with a multibus computer system which is characterized by a plurality of processors with all processors being connected to a common bus, and including at least one command processor. The command processor communicates over the bus with a plurality of joint controller cards. A plurality of direct current torque motors, of the type used in telerobot joints and telerobot hand-held controllers, are connected to the controller cards and responds to digital control signals from the command processor. Essential motor operating parameters are sensed by analog sensing circuits and the sensed analog signals are converted to digital signals for storage at the controller cards where such signals can be read during an address read/write cycle of the command processing processor.

NASA



N88-26596* National Aeronautics and Space Administration. Pasadena Office, Calif.

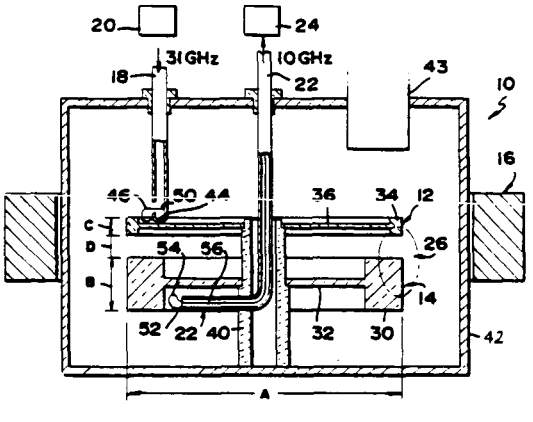
LOW NOISE CRYOGENIC DIELECTRIC RESONATOR OSCILLATOR Patent

G. JOHN DICK, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 12 Jul. 1988 7 p Filed 5 Nov. 1987 Sponsored by NASA

(NASA-CASE-NPO-17157-1-CU; US-PATENT-4,757,278; US-PATENT-APPL-SN-116810; US-PATENT-CLASS-331-3; US-PATENT-CLASS-331-94.1; US-PATENT-CLASS-331-162) Avail: US Patent and Trademark Office CSCL 09A

A microwave oscillator is provided which can operate at a temperature of many degrees above absolute zero while providing very low phase noise that has heretofore generally required temperatures within a few degrees K. The oscillator includes a ring-shaped resonant element of ruby (sapphire plus chromium) or iron sapphire crystal, lying adjacent to a resonator element of sapphire, so that the regenerator element lies directly in the magnetic field of the resonator element. The resonator element is substantially devoid of contact with electrically conductive material. Microwave energy of a pump frequency (e.g., 31 GHz) is outputted from the regenerator element, while signal energy (e.g., 10 GHz) is outputted from the resonator element.

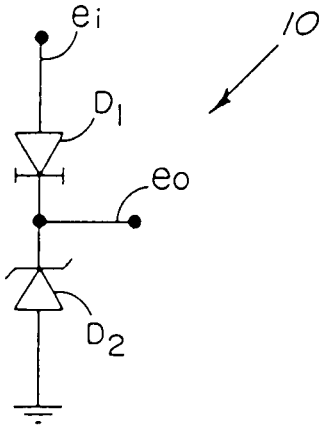
Official Gazette of the U.S. Patent and Trademark Office



N88-29095*# National Aeronautics and Space Administration. Pasadena Office, Calif.
POWER SUPPLY CONDITIONING CIRCUIT Patent Application
LORI E. PRIMAS, inventor (to NASA) and ROHAN C. LOVELAND, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 8 Jul. 1988 19 p
(Contract NAS7-918)
(NASA-CASE-NPO-17233-1-CU; NAS 1.71:NPO-17233-1-CU; US-PATENT-APPL-SN-231025) Avail: NTIS HC A03/MF A01 CSCL 09A

A conditioning circuit is provided with a constant current diode in series with a zener diode, the former having a high dynamic impedance and the latter a low dynamic impedance. The constant current diode can receive an input voltage with PARD. In conjunction with the zener diode fixed to a ground, a voltage divider is provided which can give an output voltage whose PARD was significantly reduced. The conditioning circuit is effective down to dc.

NASA



34

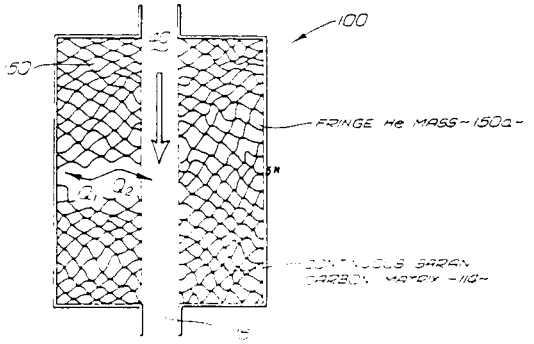
FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

N88-23946*# National Aeronautics and Space Administration. Pasadena Office, Calif.
CRYOGENIC REGENERATOR INCLUDING SARAN-CARBON HEAT CONDUCTION MATRIX Patent Application
JACK A. JONES, inventor (to NASA), S. WALTER PETRICK, inventor (to NASA), and MICHAEL J. BRITCLIFFE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 27 Aug. 1987 25 p
(Contract NAS7-918)
(NASA-CASE-NPO-17291-1-CU; NAS 1.71:NPO-17291-1-CU)
Avail: NTIS HC A03/MF A01 CSCL 20D

A saran carbon matrix is employed to conduct heat through the heat storing volume of a cryogenic regenerator. When helium is absorbed into the saran carbon matrix, the combination exhibits a volumetric specific heat much higher than previously used lead balls. A helium adsorbed saran regenerator should allow much lower refrigerator temperatures than those practically obtainable with lead based regenerators for regenerator type refrigeration systems.

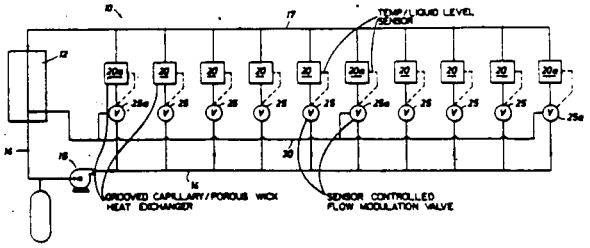
NASA



N88-23958* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PUMPED TWO-PHASE HEAT TRANSFER LOOP Patent
FRED EDELSTEIN 14 Jun. 1988 7 p Filed 1 Apr. 1987 Division of US-Patent-4,664,177, US-Patent Appl-SN-755288, dated 15 Jul. 1985
(NASA-CASE-MSC-20841-2; US-PATENT-4,750,543; US-PATENT-APPL-SN-032679; US-PATENT-CLASS-165-1; US-PATENT-CLASS-165-13; US-PATENT-CLASS-165-41; US-PATENT-CLASS-165-104.14; US-PATENT-CLASS-126-423; US-PATENT-4,664,177; US-PATENT-APPL-SN-755288) Avail: US Patent and Trademark Office CSCL 20D

A pumped loop two-phase heat transfer system, operating at a nearly constant temperature throughout, includes several independently operating grooved capillary heat exchanger plates supplied with working fluid through independent flow modulation valves connected to a liquid supply line, a vapor line for collecting vapor from the heat exchangers, a condenser between the vapor and the liquid lines, and a fluid circulating pump between the condenser and the heat exchangers.

Official Gazette of the U.S. Patent and Trademark Office

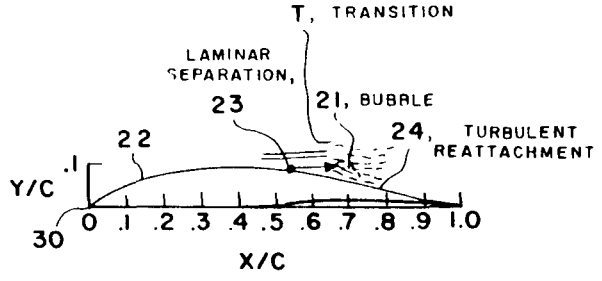


N88-24910*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
METHOD AND APPARATUS FOR DETECTING LAMINAR FLOW SEPARATION AND REATTACHMENT Patent Application
JOHN P. STACK, inventor (to NASA) and SIVARAMAKRISHNAN M. MANGALAM, inventor (to NASA) (Analytical Services and Materials, Inc., Hampton, Va.) 7 Jun. 1988 22 p
(NASA-CASE-LAR-13952-1-SB; NAS 1.71:LAR-13952-1-SB; US-PATENT-APPL-SN-203178) Avail: NTIS HC A03/MF A01 CSCL 20D

The invention is a method and apparatus for detecting laminar flow separation and flow reattachment of a fluid stream by simultaneously sensing and comparing a plurality of output signals, each representing the dynamic shear stress at one of an equal

number of sensors spaced along a straight line on the surface of an airfoil or the like that extends parallel to the fluid stream. The output signals are concurrently compared to detect the sensors across which a reversal in phase of said output signal occurs, said detected sensors being in the region of laminar separation or reattachment. The novelty in this invention is the discovery and use of the phase reversal phenomena to detect laminar separation and attachment of a fluid stream from any surface such as an airfoil supported therein.

NASA



N88-29132* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

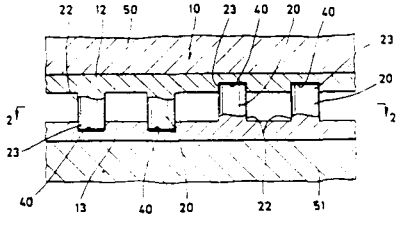
HIGH EFFECTIVENESS CONTOUR MATCHING CONTACT HEAT EXCHANGER Patent

ROBERT L. BLAKELY, inventor (to NASA), GEORGE J. ROEBELEN, JR., inventor (to NASA), and ARTHUR K. DAVENPORT, inventor (to NASA) (United Technologies Research Center, East Hartford, Conn.) 9 Aug. 1988 6 p Filed 19 Dec. 1986 Supersedes N87-18779 (25 - 11, p 1476)

(NASA-CASE-MSC-20840-1; US-PATENT-4,762,173; US-PATENT-APPL-SN-943346; US-PATENT-CLASS-165-170; US-PATENT-CLASS-165-81) Avail: US Patent and Trademark Office CSCL 20D

There is a need in the art for a heat exchanger design having a flexible core providing contour matching capabilities, which compensates for manufacturing tolerance and distortion buildups, and which accordingly furnishes a relatively uniform thermal contact conductance between the core and external heat sources under essentially all operating conditions. The core of the heat exchanger comprises a top plate and a bottom plate, each having alternate rows of pins attached. Each of the pins fits into corresponding tight-fitting recesses in the opposite plate.

Official Gazette of the U.S. Patent and Trademark Office



N88-29133* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

POLYMERIC HEAT PIPE WICK Patent

BENJAMIN SEIDENBERG 23 Aug. 1988 7 p Filed Dec. 16, 1986

(NASA-CASE-GSC-13019-1; US-PATENT-4,765,396; US-PATENT-APPL-SN-942158; US-PATENT-CLASS-165-104.26; US-PATENT-CLASS-138-38; US-PATENT-CLASS-122-366; US-PATENT-CLASS-165-905) Avail: US Patent and Trademark Office CSCL 20D

A wick for use in a capillary loop pump heat pipe is described. The wick material is an essentially uniformly porous, permeable, open-cell, polyethylene thermoplastic foam having an ultrahigh average molecular weight of from approximately 1 to 5 million, and an average pore size of about 10 to 12 microns. A representative material having these characteristics is POREX UF, which has an average molecular weight of about 3 million. This material is fully compatible with the FREONs and anhydrous ammonia and allows for the use of these very efficient working fluids in capillary loops.

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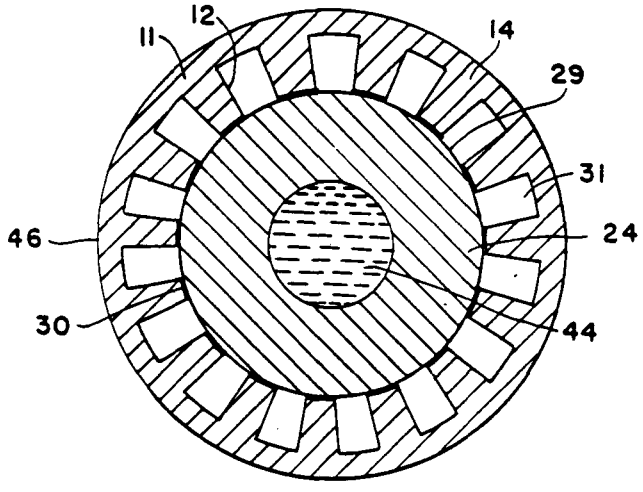


35

INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

N88-23959*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

CYLINDRICAL SURFACE PROFILE AND DIAMETER MEASURING TOOL AND METHOD Patent Application

JAMES R. CURRIE, inventor (to NASA), RALPH R. KISSEL, inventor (to NASA), EARNEST C. SMITH, inventor (to NASA), CHARLES E. OLIVER, inventor (to NASA), JOHN W. REDMON, SR., inventor (to NASA), CHARLES C. WALLACE, inventor (to NASA), and CHARLES P. SWANSON, inventor (to NASA) (Teledyne Brown Engineering, Huntsville, Ala.) 18 Nov. 1987 17 p

(NASA-CASE-MFS-28287-1; NAS 1.71:MFS-28287-1; US-PATENT-APPL-SN-122740) Avail: NTIS HC A03/MF A01 CSCL 14B

A tool is shown having a cross beam assembly made of beams joined by a center box structure. The assembly is adapted to be mounted by brackets to the outer end of a cylindrical case. The center box structure has a vertical shaft rotatably mounted therein and extending beneath the assembly. Secured to the vertical shaft is a radius arm which is adapted to rotate with the shaft. On the longer end of the radius arm is a measuring tip which contacts the cylindrical surface to be measured and which provides an electric signal representing the radius of the cylindrical surface from the center of rotation of the radius arm. An electric servomotor rotates the vertical shaft and an electronic resolver provides an electric signal representing the angle of rotation of the shaft. The electric signals are provided to a computer station which has software for its computer to calculate and print out the continuous

circumference profile of the cylindrical surface, and give its true diameter and the deviations from the ideal circle.

NASA

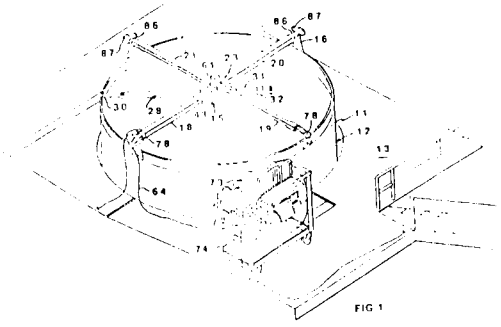


FIG 1

N88-23960*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

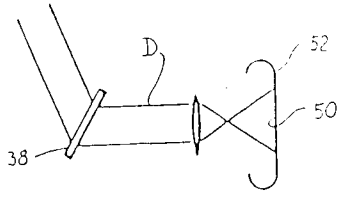
DUAL WAVELENGTH HOLOGRAPHIC INTERFEROMETRY SYSTEM Patent Application

WILLIAM K. WITHEROW, inventor (to NASA) and ANDREAS ECKER, inventor (to NASA) (European Space Agency, Paris, France) 29 Jan. 1988 10 p

(NASA-CASE-MFS-28242-1; NAS 1.71:MFS-28242-1; US-PATENT-APPL-SN-149822) Avail: NTIS HC A02/MF A01 CSCL 14B

A two-wave holographic interferometry system and method is described. In such systems, a reference beam holographic is superimposed on an object beam, the object beam being an image obtained by passing a beam through an object regarding which some parameter (e.g., temperature gradient) is to be measured. A photograph of the superimposed beams is taken. This invention employs two object and two reference beams and the invention is particularly concerned with the use of a prism assembly which causes the two different wavelengths of the object beams to emerge from the prism at slightly different angles, thereby providing two holographic images which are slightly displaced from each other.

NASA



N88-23961*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PRESSURE MEASURING PROBE Patent Application

GEORGE C. ASHBY, JR. 13 Jan. 1988 10 p

(NASA-CASE-LAR-13853-1; NAS 1.71:LAR-13853-1; US-PATENT-APPL-SN-143436) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention is a probe for measuring changes in pressure in a high velocity fluid stream over and adjacent to the surface of an object. The probe is formed of an exterior housing having a closed pressure chamber in which a piezoelectric pressure transducer is mounted. An open connector tube having a probe tip passes a portion of the fluid stream into the closed pressure chamber; any change of pressure within which requires a settling-time to appear in the closed pressure chamber that is inversely proportional to the cross-sectional area of the connector tube. A cooling chamber formed around the pressure chamber is connected to a source of cooling fluid by means of inlet and outlet tubes.

NASA

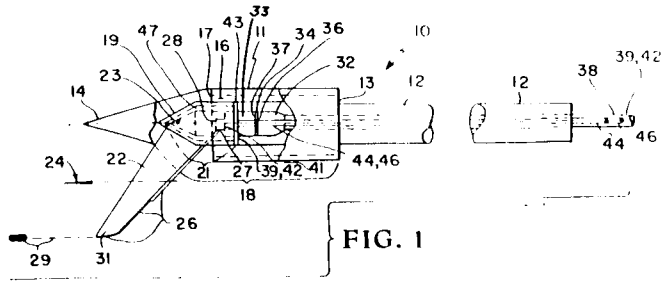


FIG. 1

N88-23962*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

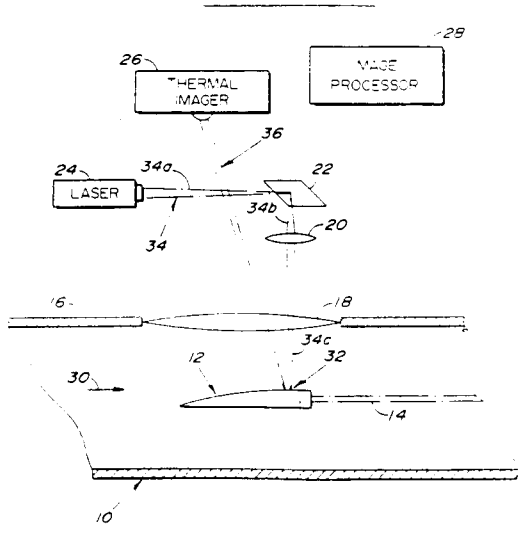
THERMAL REMOTE ANEMOMETER SYSTEM Patent Application

JOSEPH S. HEYMAN, inventor (to NASA), CHRISTOPHER WELCH, inventor (to NASA) (College of William and Mary, Williamsburg, Va.), WILLIAM E. MILLER, inventor (to NASA), D. MICHELE HEATH, inventor (to NASA), and WILLIAM P. WINFREE, inventor (to NASA) 22 Jan. 1988 13 p

(NASA-CASE-LAR-13508-1; NAS 1.71:LAR-13508-1; US-PATENT-APPL-SN-146939) Avail: NTIS HC A03/MF A01 CSCL 14B

A sample in a wind tunnel is radiated from a thermal energy source located outside the wind tunnel. A thermal imager system, also located outside the wind tunnel, reads surface radiations from the sample as a function of time. The thermal images produced are characteristic of the heat transferred from the sample to the flow across the sample. In turn, the measured rates of heat loss of the sample are characteristic of the flow and the sample.

NASA



N88-23963*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

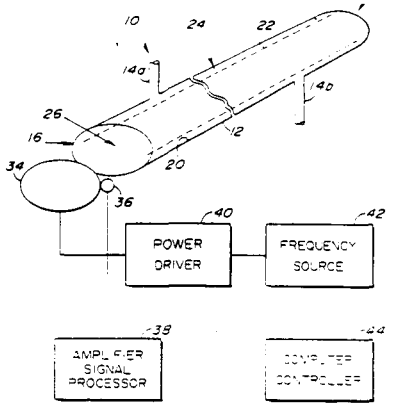
MINING VOLUME MEASUREMENT SYSTEM Patent Application

JOSEPH SAUL HEYMAN, inventor (to NASA) 22 Jan. 1988 11 p

(NASA-CASE-LAR-13519-1; NAS 1.71:LAR-13519-1; US-PATENT-APPL-SN-146938) Avail: NTIS HC A03/MF A01 CSCL 14B

In a shaft with a curved or straight primary segment and smaller off-shooting segments, at least one standing wave is generated in the primary segment. The shaft has either an open end or a closed end and approximates a cylindrical waveguide. A frequency of a standing wave that represents the fundamental mode characteristic of the primary segment can be measured. Alternatively, a frequency differential between two successive harmonic modes that are characteristic of the primary segment can be measured. In either event, the measured frequency or frequency differential is characteristic of the length and thus the volume of the shaft based on length times the bore area.

NASA



N88-23966* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

ACOUSTIC EMISSION FREQUENCY DISCRIMINATION Patent

FRANK E. SUGG, inventor (to NASA) and LLOYD J. GRAHAM, inventor (to NASA) (Rockwell International Science Center, Thousand Oaks, Calif.) 19 Apr. 1988 8 p Filed 12 Jun. 1986 Supersedes N87-14676 (25 - 06, p 776)
(NASA-CASE-MSC-20467-1; US-PATENT-4,738,137; US-PATENT-APPL-SN-874319; US-PATENT-CLASS-73-587; US-PATENT-CLASS-73-801) Avail: US Patent and Trademark Office CSCL 14B

In acoustic emission nondestructive testing, broadband frequency noise is distinguished from narrow banded acoustic emission signals, since the latter are valid events indicative of structural flaws in the material being examined. This is accomplished by separating out those signals which contain frequency components both within and beyond (either above or below) the range of valid acoustic emission events. Application to acoustic emission monitoring during nondestructive bond verification and proof loading of undensified tiles on the Space Shuttle Orbiter is considered.

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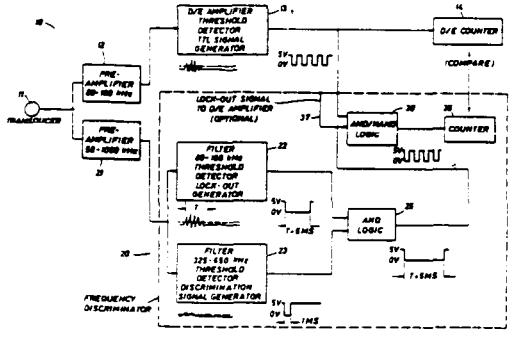

N88-23967* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

BEARING-BYPASS MATERIAL SYSTEM TEST Patent

JOHN H. CREW, JR., inventor (to NASA) 12 Jan. 1988 4 p Filed 12 Feb. 1987 Supersedes N87-25556 (25 - 19, p 2611)
(NASA-CASE-LAR-13458-1; US-PATENT-4,718,281; US-PATENT-APPL-SN-013802; US-PATENT-CLASS-73-794; US-PATENT-CLASS-73-810) Avail: U.S. Patent and Trademark Office CSCL 14B

A material specimen containing a central hole is bolted between two bearing guide plates. An applied load control exerts an applied load, either tension or compression, to one end of the specimen and a bypass load control applies a bypass load to the other end of the specimen. Both load controls have their control inputs supplied by a single input signal generator. The difference between the applied load and the bypass load is transmitted through the bolt and plate to the bearing load cells.

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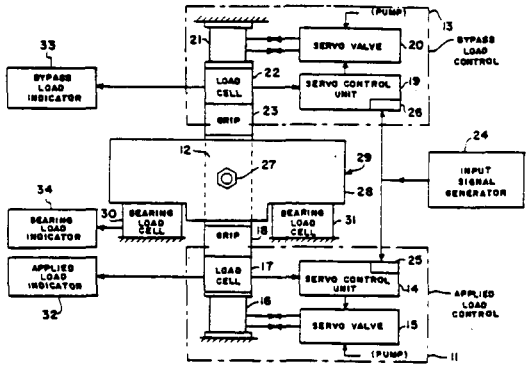

N88-24927* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

LINEAR FORCE DEVICE Patent

JOHN P. CLANCY 12 Apr. 1988 8 p Filed 30 Apr. 1987 Continuation of US-Patent-Appl-SN-790596, Oct. 23, 1985, abandoned
(NASA-CASE-MSC-20549-2; US-PATENT-4,736,927; US-PATENT-APPL-SN-045743; US-PATENT-CLASS-254-93-R; US-PATENT-CLASS-254-93-H; US-PATENT-CLASS-72-750; US-PATENT-CLASS-269-246; US-PATENT-CLASS-269-147; US-PATENT-APPL-SN-790596) Avail: US Patent and Trademark Office CSCL 14B

The object of the invention is to provide a mechanical force actuator which is lightweight and manipulatable and utilizes linear motion for push or pull forces while maintaining a constant overall length. The mechanical force producing mechanism comprises a linear actuator mechanism and a linear motion shaft mounted parallel to one another. The linear motion shaft is connected to a stationary or fixed housing and to a movable housing where the movable housing is mechanically actuated through actuator mechanism by either manual means or motor means. The housings are adapted to releasably receive a variety of jaw or pulling elements adapted for clamping or prying action. The stationary housing is adapted to be pivotally mounted to permit an angular position of the housing to allow the tool to adapt to skewed interfaces. The actuator mechanisms is operated by a gear train

to obtain linear motion of the actuator mechanism.

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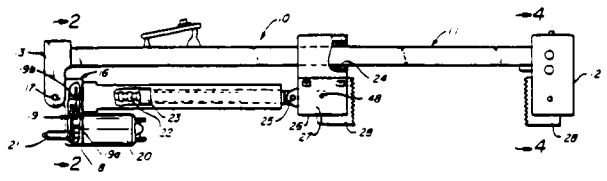


N88-24941*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

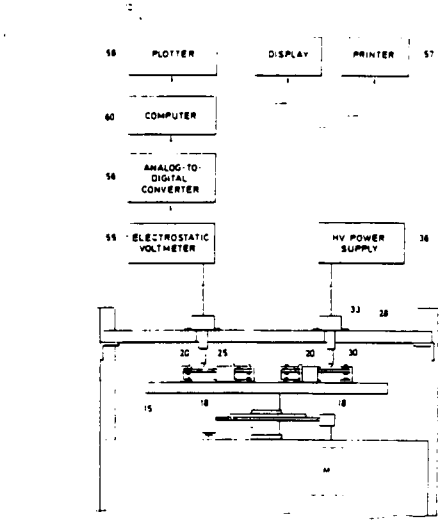
ELECTROSTATIC DISCHARGE TEST APPARATUS Patent Application

WILLIAM CONRAD SMITH, inventor (to NASA) (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) 16 Feb. 1988 20 p

(NASA-CASE-MSC-21094-1; NAS 1.71:MSC-21094-1; US-PATENT-APPL-SN-156393) Avail: NTIS HC A03/MF A01 CSCL 14B

Electrostatic discharge properties of materials are quantitatively measured and ranked. Samples are rotated on a turntable beneath selectable, co-available electrostatic chargers, one being a corona charging element and the other a sample-engaging triboelectric charging element. Samples then pass under a voltage meter to measure the amount of residual charge on the samples. After charging is discontinued, measurements are continued to record the charge decay history over time.

NASA



N88-24942*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

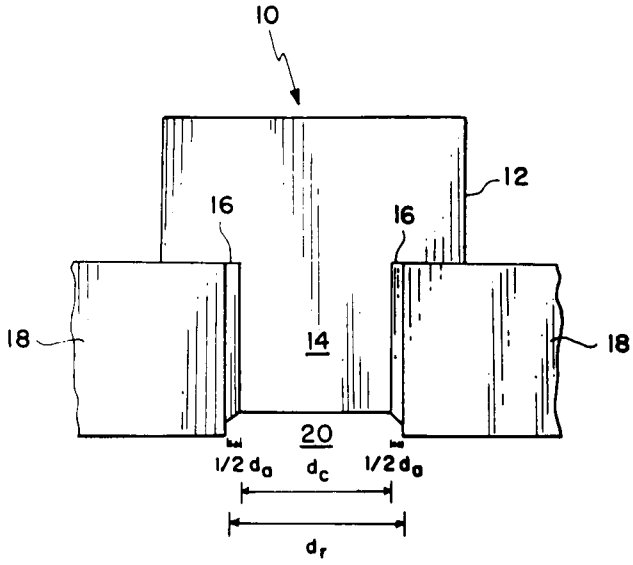
THERMAL COMPENSATING MOUNT Patent Application

ANTONY JALINK, JR., inventor (to NASA) and SCOTT R. CAMPBELL, inventor (to NASA) (KEI Laser, Fla.) 14 Mar. 1988 9 p

(NASA-CASE-LAR-13794-1; NAS 1.71:LAR-13794-1; US-PATENT-APPL-SN-168065) Avail: NTIS HC A02/MF A01 CSCL 14B

This invention relates to a device for mounting an alignment sensitive component to provide stability during temperature fluctuations. Alignment sensitive components such as quartz prisms for lasers are often subjected to temperature changes which result in undesirable misalignment from thermal expansion. A thermal compensating mount is provided for an alignment sensitive component. The thermal compensating mount comprises a cylindrical extension which is formed integral to and has the same coefficient of thermal expansion as the alignment sensitive component. A cylindrical receptacle is formed into a mounting surface. The cylindrical extension is placed into the cylindrical receptacle and is secured by an adhesive. The difference between the diameter of the cylindrical and the cylindrical receptacle is such that the differential thermal expansion across the cylindrical extension and the edges of the cylindrical receptacle is exactly compensated for by the thermal expansion of the adhesive. The novelty of this invention resides in its selection of materials with compatible coefficients of thermal expansion to mount an alignment sensitive device.

NASA



N88-24943*# National Aeronautics and Space Administration. Pasadena Office, Calif.

NONCONTACT TEMPERATURE PATTERN MEASURING DEVICE Patent Application

D. D. ELLEMAN, inventor (to NASA), J. L. ALLEN, inventor (to NASA), and M. C. LEE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 12 Nov. 1987 23 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

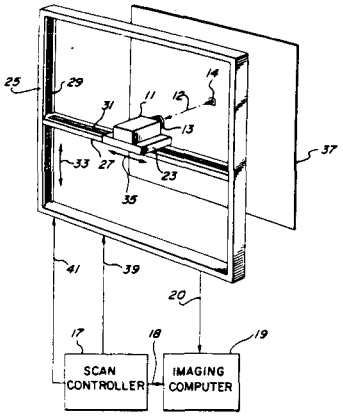
(Contract NAS7-918)

(NASA-CASE-NPO-17024-1-CU; NAS 1.71:NPO-17024-1-CU; US-PATENT-APPL-SN-159613) Avail: NTIS HC A03/MF A01 CSCL 14B

This invention relates to a noncontact imagine pyrometer system for obtaining the true temperature image of a given substance in a contactless fashion without making assumptions about localized emissivity of the substance or the uniformity of the temperature distribution. Such a contactless temperature imaging system has particular application in the study and production of many materials where the physical contact required to make a conventional temperature measurement drastically effects or contaminates the physical process being observed. Two examples where accurate temperature profiles are of critical interest are: (1) the solid-liquid phase change interface in the production of electronic materials and (2) metastable materials in the undercooling region. The apparent novelty resides in the recognition that an active pyrometer system may be advantageously adapted to perform contactless

temperature imaging so that an accurate temperature profile can be obtained.

NASA



N88-24944*# National Aeronautics and Space Administration. Pasadena Office, Calif.

ATMOSPHERIC AUTOROTATING IMAGING DEVICE Patent Application

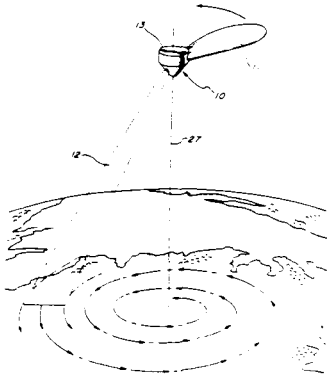
JAMES D. BURKE, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 28 Mar. 1988 15 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-17390-1-CU; NAS 1.71:NPO-17390-1-CU; US-PATENT-APPL-SN-205899) Avail: NTIS HC A03/MF A01 CSCL 14B

This invention relates to a scanning imaging device for deployment in either terrestrial or extraterrestrial atmospheres. An object of the present invention is to provide an extremely simple device that, upon deployment in an atmospheric environment, automatically rotates without the use of a propulsion system. An image detector appropriately disposed therein scans a panoramic view with each rotation of the device. Data gathered by the image detector may be transmitted to a remote receiver. The present invention may be particularly useful in the exploration of, for example, the Martian surface. The novelty of the present invention resides in the ability of the device to scan an image without the use of any moving parts or the expenditure of fuel energy.

NASA



N88-29145*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

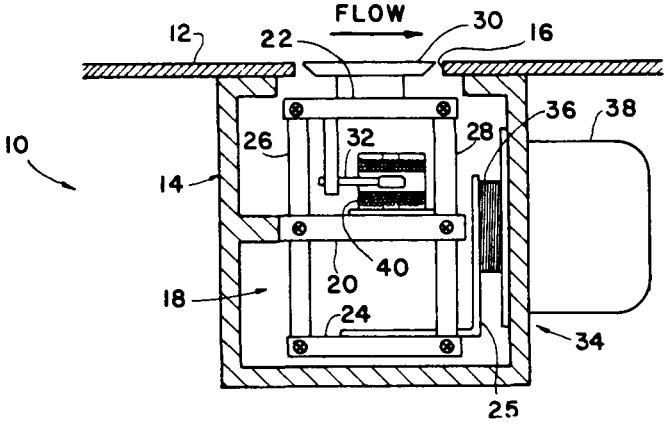
SKIN FRICTION BALANCE Patent Application

TCHENG PING, inventor (to NASA) and FRANK H. SUPPLEE, JR., inventor (to NASA) 23 Jun. 1988 21 p

(NASA-CASE-LAR-13710-1; NAS 1.71:LAR-13710-1; US-PATENT-APPL-SN-210487) Avail: NTIS HC A03/MF A01 CSCL 14B

A skin friction balance uses a parallel linkage mechanism to avoid inaccuracies in skin friction measurement attributable to off-center normal forces. The parallel linkage mechanism includes a stationary plate mounted in a cage, and an upper and lower movable plate which are linked to each other and to the stationary plate throught three vertical links. Flexure pivots are provided for pivotally connecting the links and the plates. A sensing element connected to the upper plate moves in response to skin friction, and the lower plate moves in the opposite direction of the upper plate. A force motor maintains a null position of the sensing element by exerting a restoring force in response to a signal generated by a linear variable differential transformer (LVDT).

NASA



N88-29149* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

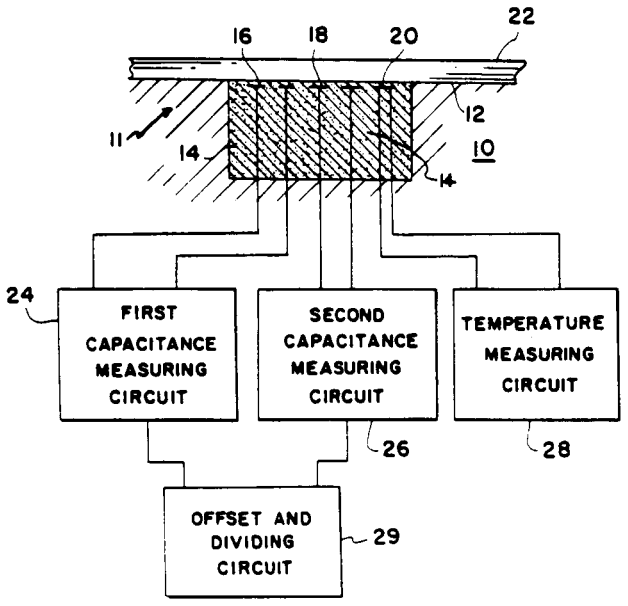
ICE DETECTOR Patent

LEONARD M. WEINSTEIN, inventor (to NASA) 23 Aug. 1988 9 p Continuation-in-part of US-Patent-Appl-SN 846429, filed 31 Mar. 1986, abandoned

(NASA-CASE-LAR-13776-1; US-PATENT-4,766,369; US-PATENT-APPL-SN-054980; US-PATENT-CLASS-324-61-R; US-PATENT-CLASS-244-134-F; US-PATENT-CLASS-340-580; US-PATENT-APPL-SN-846429) Avail: US Patent and Trademark Office CSCL 14B

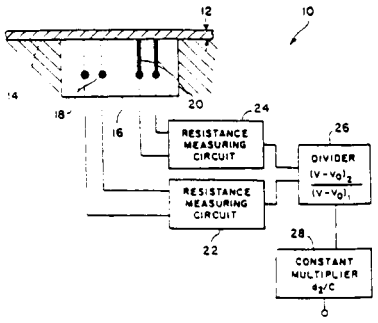
An ice detector is provided for the determination of the thickness of ice on the outer surface on an object (e.g., aircraft) independently of temperature or the composition of the ice. First capacitive gauge, second capacitive gauge, and temperature gauge are embedded in embedding material located within a hollowed out portion of the outer surface. This embedding material is flush with the outer surface to prevent undesirable drag. The first capacitive gauge, second capacitive gauge, and the temperature gauge are respectively connected to first capacitive measuring circuit, second capacitive measuring circuit, and temperature measuring circuit. The geometry of the first and second capacitive gauges is such that the ratio of the voltage outputs of the first and second capacitance measuring circuits is proportional to the thickness of ice, regardless of ice temperature or composition. This ratio is

determined by offset and dividing circuit.
Official Gazette of the U.S. Patent and Trademark Office



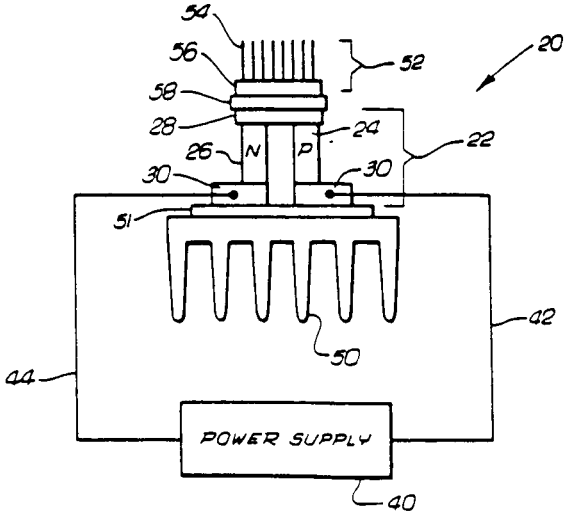
N88-29150* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LIQUID THICKNESS GAUGE Patent
LEONARD M. WEINSTEIN, inventor (to NASA) 23 Aug. 1988 8 p Continuation-in-part of US-Patent-Appl-SN-890982, filed 30 Jul. 1986, abandoned, which is a continuation-in-part of US-Patent-Appl-SN-684186, filed 20 Dec. 1984, abandoned (NASA-CASE-LAR-13826-1; US-PATENT-4,765,187; US-PATENT-APPL-SN-102705; US-PATENT-CLASS-73-304-R; US-PATENT-CLASS-73-290-R; US-PATENT-APPL-SN-890982; US-PATENT-APPL-SN-684186) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus are developed to measure the thickness of a liquid on a surface independent of liquid conductivity. Two pairs of round, corrosion resistant wires are mounted in an insulating material such that the cross-sectional area of each wire is flush with and normal to the surface. The resistance between each pair of wires is measured using two ac resistance measuring circuits, in which the ratio of the outputs of the two resistance measuring circuits is indicative of the thickness of the liquid on the surface.
Official Gazette of the U.S. Patent and Trademark Office



N88-29151* National Aeronautics and Space Administration. Pasadena Office, Calif.
THERMOCOUPLE FOR HEATING AND COOLING OF MEMORY METAL ACTUATORS Patent
CHARLES WOOD, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Aug. 1988 7 p Filed 23 Jul. 1987 Supersedes N87-29799 (25 - 24, p 3315) (NASA-CASE-NPO-17068-1-CU; US-PATENT-4,765,139; US-PATENT-APPL-SN-076956; US-PATENT-CLASS-60-527) Avail: US Patent and Trademark Office CSCL 14B

A semiconductor thermocouple unit is provided for heating and cooling memory metal actuators. The semiconductor thermocouple unit is mounted adjacent to a memory metal actuator and has a heat sink attached to it. A flexible thermally conductive element extends between the semiconductor thermocouple and the actuator and serves as a heat transfer medium during heating and cooling operations.
Official Gazette of the U.S. Patent and Trademark Office

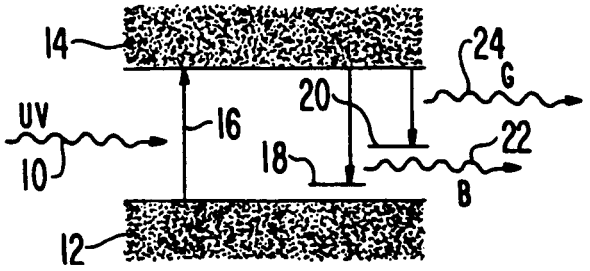


N88-30105*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
QUANTITATIVE SURFACE TEMPERATURE MEASUREMENT USING TWO-COLOR THERMOGRAPHIC PHOSPHORS AND VIDEO EQUIPMENT Patent Application
GREGORY M. BUCK, inventor (to NASA) 13 Jun. 1988 14 p (NASA-CASE-LAR-13740-1; NAS 1.71:LAR-13740-1; US-PATENT-APPL-SN-205900) Avail: NTIS HC A03/MF A01 CSCL 14B

A thermal imaging system provides quantitative temperature information and is particularly useful in hypersonic wind tunnel

applications. An object to be measured is prepared by coating with a two-color, ultraviolet-activated, thermographic phosphor. The colors emitted by the phosphor are detected by a conventional color video camera. A phosphor emitting blue and green light with a ratio that varies depending on temperature is used so that the intensity of light in the blue and green wavelengths detected by the blue and green tubes in the video camera can be compared. Signals representing the intensity of blue and green light at points on the surface of the model in a hypersonic wind tunnel are used to calculate a ratio of blue to green light intensity which provides quantitative temperature information for the surface of the model.

NASA



N88-30108* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD OF ATTACHING STRAIN GAUGES TO VARIOUS MATERIALS Patent

TIMOTHY D. SCHOTT, inventor (to NASA), ROBERT L. FOX, inventor (to NASA), and JOHN D. BUCKLEY, inventor (to NASA) 30 Aug. 1988 7 p Continuation-in-part of US-Patent-Appl-SN-831372, filed 20 Feb. 1986, abandoned (NASA-CASE-LAR-13797-1; US-PATENT-4,767,484; US-PATENT-APPL-SN-074792; US-PATENT-CLASS-156-233; US-PATENT-CLASS-156-247; US-PATENT-CLASS-156-272.4; US-PATENT-CLASS-156-274.8; US-PATENT-CLASS-156-275.5; US-PATENT-CLASS-156-307.7; US-PATENT-APPL-SN-831372)
Avail: US Patent and Trademark Office CSCL 14B

A method is provided to bond strain gauges to various materials. First, a tape with an adhesive backing is placed across the inside of the fixture frame. The strain gauge is flatly placed against the adhesive backing and coated with a thin, uniform layer of adhesive. The tape is then removed from the fixture frame and placed, strain gauge side down, on the material to be tested. If the material is a high reluctance material, the induction heating source is placed on the tape. If the material is a low reluctance material, a plate with a ferric side and a rubber side is placed, ferric side down, onto the tape. The induction heating source is then placed upon the rubber side. If the material is an insulator material, a ferric plate is placed on the tape. The induction heating source is then placed on the ferric plate. The inductive heating source then generates frequenty from 60 to 70 kilocycles to inductively heat either low reluctance material, ferric side, of ferric plate and provides incidental pressure of approximately five pounds per square inch to the tape for two minutes, thoroughly curing the adhesive. The induction heating source, and, if necessary, the plate or ferric plate, are then removed from the tape after one minute. The tape is then removed from the bonded strain gauge.

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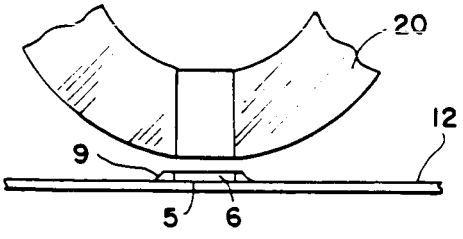

36

LASERS AND MASERS

Includes parametric amplifiers.

N88-24958* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RANGE AND RANGE RATE SYSTEM Patent

OLIN L. GRAHAM, inventor (to NASA), JIM K. RUSSELL, inventor (to NASA), and WALTER L. EPPERLY, inventor (to NASA) (Westinghouse Electric Corp., Baltimore, Md.) 5 Apr. 1988 8 p Filed 4 May 1987 Supersedes N87-25570 (25 - 19, p 2614) (NASA-CASE-MSC-20867-1; US-PATENT-4,736,247; US-PATENT-APPL-SN-045984; US-PATENT-CLASS-358-107; US-PATENT-CLASS-356-1; US-PATENT-CLASS-356-4; US-PATENT-CLASS-356-376; US-PATENT-CLASS-364-561)
Avail: US Patent and Trademark Office CSCL 20E

A video controlled solid state range finding system which requires no radar, high power laser, or sophisticated laser target is disclosed. The effective range of the system is from 1 to about 200 ft. The system includes an opto-electric camera such as a lens CCD array device. A helium neon laser produces a source beam of coherent light which is applied to a beam splitter. The beam splitter applies a reference beam to the camera and produces an outgoing beam applied to a first angularly variable reflector which directs the outgoing beam to the distant object. An incoming beam is reflected from the object to a second angularly variable reflector which reflects the incoming beam to the opto-electric camera via the beam splitter. The first reflector and the second reflector are configured so that the distance travelled by the outgoing beam from the beam splitter and the first reflector is the same as the distance travelled by the incoming beam from the second reflector to the beam splitter. The reference beam produces a reference signal in the geometric center of the camera. The incoming beam produces an object signal at the camera.

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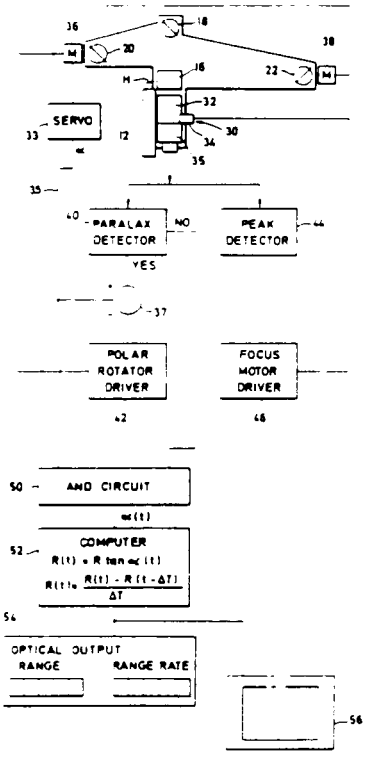


37

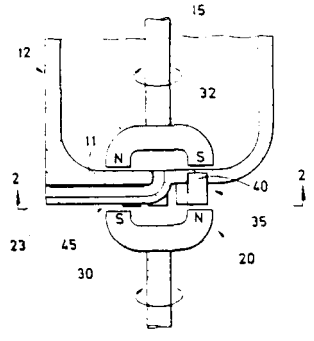
MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N88-23973*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MAGNETIC DRIVE COUPLING Patent Application
EDWARD L. CARTER, inventor (to NASA) (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) 18 Dec. 1987 14 p
(NASA-CASE-MSC-21171-1; NAS 1.71:MSC-21171-1; US-PATENT-APPL-SN-135120) Avail: NTIS HC A03/MF A01 CSCL 13I

The driving and driven members of a magnetic drive are separated by en enlarged gap to provide clearance for a conduit or other member. Flux pins in the gap maintain the torque transmitting capability of the drive. The spacing between two of the flux pins is increased to provide space for the conduit.

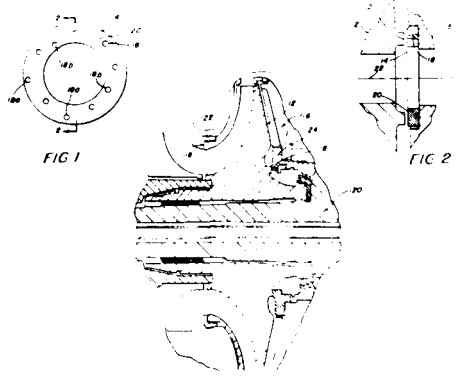
NASA



N88-23974*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ROTOR SELF-LUBRICATING AXIAL STOP Patent Application
DALE H. BLOUNT 29 Jan. 1988 11 p
(NASA-CASE-MFS-28273-1; NAS 1.71:MFS-28273-1; US-PATENT-APPL-SN-149830) Avail: NTIS HC A03/MF A01 CSCL 13I

A series of lubricating plugs is located in the stationary backup face adjacent to the axial stop face of a rotating impeller mounted in a turbopump for pumping liquid oxygen or liquid hydrogen. The stop face and the backup face are those surfaces which engage when the axial load on the impeller exceeds the load balancing capability. The plugs have a truncated conical configuration so as to be trapped in the backup face, and are placed at varying radii on the face to provide complete surface lubrication. The plugs may be formed from Teflon, Kel-F or bronze filled Teflon.

NASA



N88-23978* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL STRESS MINIMIZED, TWO COMPONENT, TURBINE SHROUD SEAL Patent
ROBERT F. HANDSCHUH, inventor (to NASA) 1 Mar. 1988 12 p Filed 18 Jun. 1986 Supersedes N86-32740 (24 - 24, P 3735)
(NASA-CASE-LEW-14212-1; US-PATENT-4,728,257; US-PATENT-APPL-SN-875798; US-PATENT-CLASS-415-136; US-PATENT-CLASS-415-170-R) Avail: US Patent and Trademark Office CSCL 13I

In a turbine machine, a two-component shroud seal which maximizes insulation and sealing around the rotating turbine blades, and is made by independently fabricating each of the two components then joining them together, is disclosed. The two components may be joined together at room temperature. The resulting shroud seal provides greater engine efficiency and thrust.

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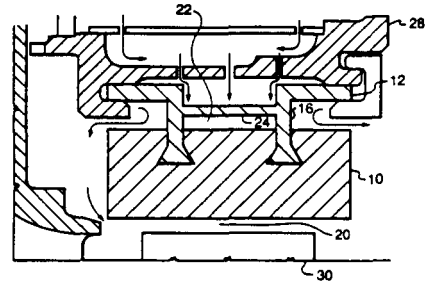
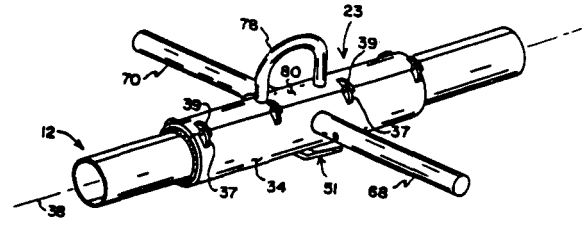


N88-23979* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
BI-STEM GRIPPING APPARATUS Patent
FRED G. SANDERS, inventor (to NASA) 9 Feb. 1988 7 p Filed 3 Jun. 1987 Supersedes N87-25586 (25 - 19, p 2616)
(NASA-CASE-MFS-28185-1; US-PATENT-4,723,800; US-PATENT-APPL-SN-056930; US-PATENT-CLASS-294-16; US-PATENT-CLASS-294-106; US-PATENT-CLASS-294-113; US-PATENT-CLASS-294-119.2) Avail: US Patent and Trademark Office CSCL 13I

This invention relates to devices which grip cylindrical structures and more particularly to a device which has three arcuate gripping members having frictional surfaces for gripping and compressing a bi-stem. The bi-stem gripping apparatus is constructed having a pair of side gripping members, and an intermediate gripping member disposed between them. Sheets of a gum stock silicone rubber with frictional gripping surfaces are bonded to the inner region of the gripping members and provide frictional engagement between the bi-stem and the apparatus. A latch secures the gripping apparatus to a bi-stem, and removable handles are attached, allowing an astronaut to pull the bi-stem from its cassette. A tethering ring on the outside of the gripping apparatus provides a convenient point to which a lanyard may be attached.

Official Gazette of the U.S. Patent and Trademark Office



N88-23980* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WELDING TORCH GAS CUP EXTENSION Patent
STEPHEN S. GORDON, inventor (to NASA) (Rockwell International Corp., Huntsville, Ala.) 7 Jun. 1988 5 p Filed 30 Apr. 1987 Superseded N87-25587 (25 - 19, p 2616)
(NASA-CASE-MFS-29252-1; US-PATENT-4,749,839; US-PATENT-APPL-SN-044181; US-PATENT-CLASS-219-75; US-PATENT-CLASS-219-137.42) Avail: US Patent and Trademark Office CSCL 13I

The invention relates to a gas shielded electric arc welding torch having a detachable gas cup extension which may be of any desired configuration or length. The gas cup extension assembly is mounted on a standard electric welding torch gas cup to enable welding in areas with limited access. The gas cup assembly has an upper tubular insert that fits within the gas cup such that its lower portion protrudes thereform and has a lower tubular extension that is screwed into the lower portion. The extension has a rim to define the outer perimeter of the seat edge about its entrance opening so a gasket may be placed to effect an airtight seal between the gas cup and extension. The tubular extension may be made of metal or cermaic material that can be machined. The novelty lies in the use of an extension assembly for a standard gas cup of an electric arc welding torch which extension assembly is detachable permitting the use of a number of extensions which may be of different configurations and materials and yet fit the standard gas cup.

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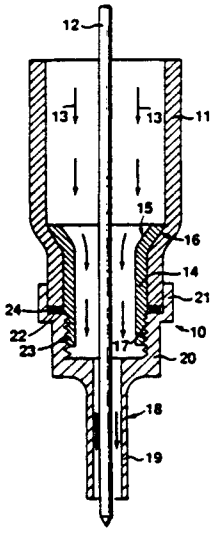

N88-23981* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPOSITE PISTON Patent
ALLAN H. TAYLOR, inventor (to NASA) 12 Apr. 1988 10 p Filed 30 Jul. 1986 Supersedes N87-15464 (25 - 07, p 908)
(NASA-CASE-LAR-13435-1; US-PATENT-4,736,676; US-PATENT-APPL-SN-890683; US-PATENT-CLASS-92-212; US-PATENT-CLASS-92-176; US-PATENT-CLASS-92-214; US-PATENT-CLASS-92-222; US-PATENT-CLASS-92-224; US-PATENT-CLASS-123-193-P) Avail: US Patent and Trademark Office CSCL 13I

A composite piston structure is disclosed which provides a simple and reliable means for joining a carbon-carbon or ceramic piston cap with a metallic piston body. Attachment is achieved by means of a special geometry which compensates for differences in thermal expansion without complicated mechanical fastening devices. The shape employs a flange created by opposed frustoconical shapes with coincident vertices intersecting on the radial centerline of the piston in order to retain the piston cap. The use of carbon-carbon for the piston cap material allows a close fit between the piston and a cylinder wall, eliminating the need for piston rings. The elimination of extra mechanical parts of previous composite pistons provides a lightweight composite piston capable of extended high temperature operation.

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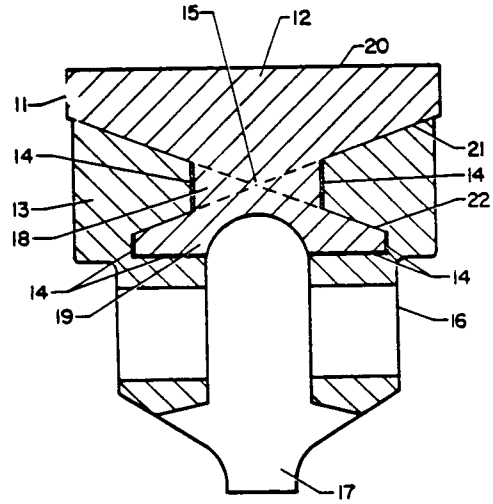

N88-23982* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VARIABLE RESPONSE LOAD LIMITING DEVICE Patent
DWIGHT D. MCSMITH, inventor (to NASA) 19 Jan. 1988 9 p Filed 6 Oct. 1981 Supersedes N82-20544 (20 - 11, p 1515)
(NASA-CASE-LAR-12801-1; US-PATENT-4,720,139; US-PATENT-APPL-SN-309291; US-PATENT-CLASS-297-216; US-PATENT-CLASS-188-373; US-PATENT-CLASS-248-548; US-PATENT-CLASS-248-608) Avail: US Patent and Trademark Office CSCL 13I

An energy absorbing device used as a load limiting member in a structure to control its response to applied loads is described. It functions by utilizing a spool assembly having flanged ends and an interior cavity of sufficiently large diameter to cause it to deform plastically at a prescribed load. In application, the spool is utilized as a pivot point for the legs of an airplane seat. When properly designed and integrated into the seat arrangement the spool will twist about its axis, deforming plastically when the impact load exceeds the spool yield value. Through this deformation, the spool absorbs the kinetic energy of the movement of the seat at a substantially constant rate, thereby controlling the level of loads transmitted to the seat occupant. By proper sizing and collection

of materials, it is possible to control load response in a predictable manner.

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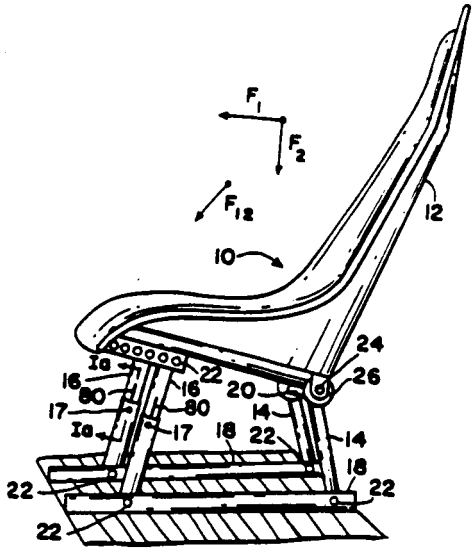


N88-24969*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

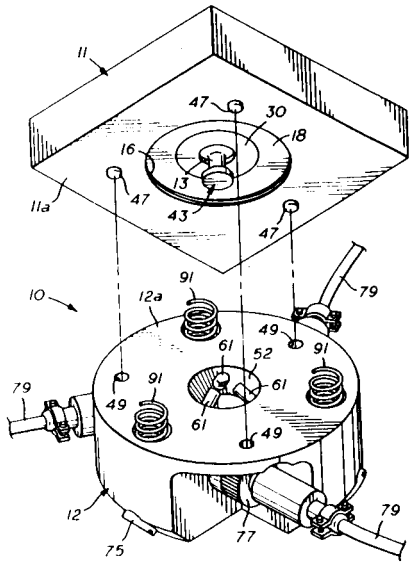
TOGGLE RELEASE Patent Application

THOMAS JOSEPH GRAVES, inventor (to NASA), ROBERT ALEXANDER YANG, inventor (to NASA), and CHRISTOPHER WILLIAM BROWN, inventor (to NASA) (Boeing Aerospace Co., Seattle, Wash.) 11 Feb. 1988 21 p

(NASA-CASE-MSC-21354-1; NAS 1.71:MSC-21354-1; US-PATENT-APPL-SN-154712) Avail: NTIS HC A03/MF A01 CSCL 13I

The invention relates to a pyrotechnic actuated release mechanism which is mechanically two fault tolerant for effecting release. It is particularly well suited for releasably connecting structures to be used in the space environment or in other aerospace applications. The device comprises a fastener plate and fastener body, each attachable to either one of a pair of structures to be joined. The fastener plate and the body are fastenable by a toggle supported at one end on the fastener plate and mounted for universal pivotal movement thereon. At its other end, which is received in a central opening in the fastener body and adapted for limited pivotal movement therein, the toggle is restrained by three retractable latching pins. Each pin is individually retractable by combustion of a pyrotechnic charge. While retraction of all three pins releases the toggle, the fastener is mechanically two fault tolerant since the failure of any single or pair of the latch pins to retract results in an asymmetrical loading on the toggle and its pivotal movement to effect a release. An annular bolt is mounted on the fastener plate as a support for the socket mounting of the toggle whereby its selective axial movement provides a means for pre-loading the toggle.

NASA



N88-24970*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STRUCTURALLY TAILORABLE NON-LINEAR SNAP-THROUGH SPRING SYSTEM Patent Application

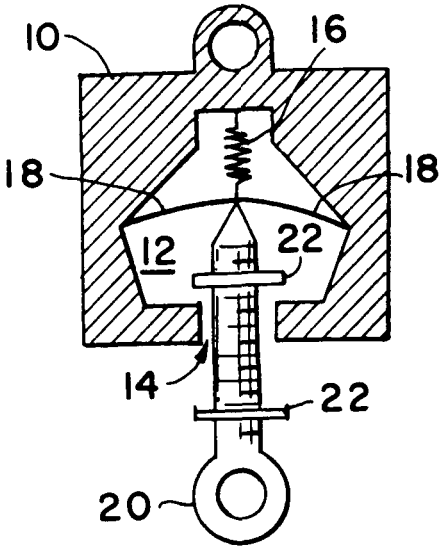
GARY L. FARLEY, inventor (to NASA), JAMES H. STARNES, JR., inventor (to NASA), and WAYNE R. MANTAY, inventor (to NASA) (Army Aviation Systems Command, Hampton, Va.) 1 Apr. 1988 11 p

(NASA-CASE-LAR-13729-1; NAS 1.71:LAR-13729-1; US-PATENT-APPL-SN-176544) Avail: NTIS HC A03/MF A01 CSCL 13K

The invention relates to a structural, tailorable, nonlinear spring system which has a controllable, predictable and abrupt change in load-deflection response and which is readily adaptable to structural applications. In particular, the system can be employed to change the geometry of helicopter rotor blades as the aerodynamic and centrifugal forces acting upon the rotor blades change. The spring system comprises an external case containing a pin-connected two-bar linkage and a tension or compression spring. As a load is applied to the snap-through spring the linkage bars laterally deform until the bars collapse and snap-through. The stiffness as the load is applied is a function of the axial stiffness of the internal spring and bending stiffness of the pin-connected two-bar linkage. When the snap-through occurs, a large deformation occurs as a result of the small increase of applied load. The load-deflection response at this point is a function of the internal spring and the membrane stiffness of the bars. Additional stiffness can be provided to the post-snap-through response by including restraints that contact the external spring case. The load-deflection response of the system is tailorable by changing the size, stiffness and orientation of its various components. In addition, multiple devices can be put in parallel or

series to produce an infinite number of different load-deflection responses.

NASA



N88-24971*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

UNIVERSAL PRECISION SINE BAR ATTACHMENT Patent Application

FRANKLIN D. MANN, inventor (to NASA) 9 Mar. 1988 17 p
(NASA-CASE-MFS-28253-1; NAS 1.71:MFS-28253-1;
US-PATENT-APPL-SN-165943) Avail: NTIS HC A03/MF A01
CSCL 13H

This invention relates to an attachment for a sine bar which can be used to perform measurements during lathe operations or other types of machining operations. The attachment can be used for setting precision angles on vises, dividing heads, rotary tables and angle plates. It can also be used in the inspection of machined parts, when close tolerances are required, and in the layout of precision hardware. The novelty of the invention is believed to reside in a specific versatile sine bar attachment for measuring a variety of angles on a number of different types of equipment.

NASA

N88-24972*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

TRAILER SHIELD ASSEMBLY FOR A WELDING TORCH Patent Application

GERALD E. DYER, inventor (to NASA) (Rockwell International Corp., Huntsville, Ala.) 16 Feb. 1988 15 p
(NASA-CASE-MFS-29260-1; NAS 1.71:MFS-29260-1;
US-PATENT-APPL-SN-156059) Avail: NTIS HC A03/MF A01
CSCL 13H

This invention relates generally to trailer shields for gas shielded arc welding torches, and more particularly to a trailer shield assembly provided with a shield gas manifold for providing an even dispersion of shield gas to the interior of the shield assembly, which generally encloses a joint being welded and a welding trailing portion of hot welded metal. The novelty of the invention lies in providing trailer shield with a manifold tube having a plurality of openings from which shield gas is distributed. A gas manifold region ahead of the torch is also provided with shield gas from a tube to protect metal preheated by the torch. Further novelty lies in constructing portions of sides and housing and portions of side walls of the guide of stainless steel screen having a tight mesh.

NASA

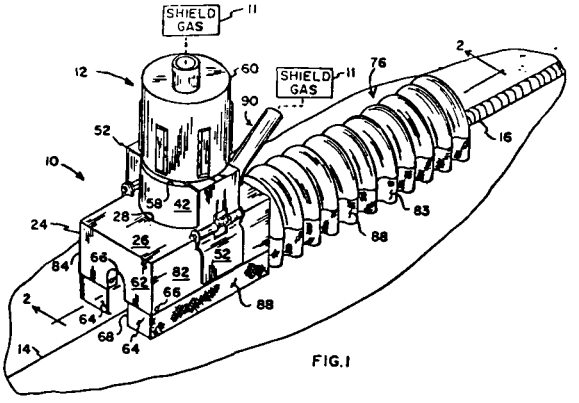


FIG.1

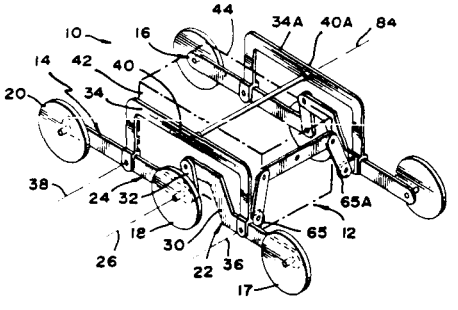
N88-24973*# National Aeronautics and Space Administration. Pasadena Office, Calif.

ARTICULATED SUSPENSION SYSTEM Patent Application

DONALD B. BICKLER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 22 Mar. 1988 12 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.
(Contract NAS7-918)
(NASA-CASE-NPO-17354-1-CU; NAS 1.71:NPO-17354-1-CU;
US-PATENT-APPL-SN-184236) Avail: NTIS HC A03/MF A01
CSCL 13F

The invention provides a rough terrain vehicle which maintains a substantially constant weight, and therefore traction, on all wheels, despite one wheel moving considerably higher or lower than the others, while avoiding a very soft spring suspension. The vehicle includes a chassis or body to be supported and a pair of side suspensions at either side of the body. In a six wheel vehicle, each side suspension includes a middle wheel, and front and rear linkages respectively coupling the front and rear wheels to the middle wheel. A body link pivotally connects the front and rear linkages together, with the middle of the body link rising or falling by only a fraction of the rise or fall of any of the three wheels. The body link pivotally supports the middle of the length of the body. A transverse suspension for suspending the end of the body on the side suspensions includes a middle part pivotally connected to the body about a longitudinal axis and opposite ends each pivotally connected to one of the side suspensions along at least a longitudinal axis.

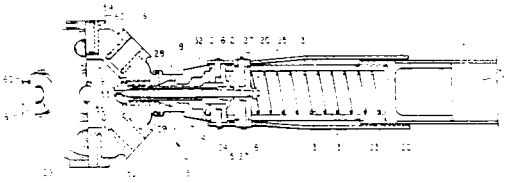
NASA



N88-29180* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COLLET LOCK JOINT FOR SPACE STATION TRUSS Patent
CLARENCE J. WESSELSKI, inventor (to NASA) 16 Aug. 1988 13 p Filed 1 Apr. 1987 Supersedes N87-25576 (25 - 19, p 2615)
(NASA-CASE-MSC-21207-1; US-PATENT-4,763,459; US-PATENT-APPL-SN-032818; US-PATENT-CLASS-52-646; US-PATENT-CLASS-52-648; US-PATENT-CLASS-403-217; US-PATENT-CLASS-403-171) Avail: US Patent and Trademark Office CSCL 13I

A lock joint for a Space Station has a series of struts joined together in a predetermined configuration by node point fittings. The fittings have removeable inserts. The lock joint has an elongated housing connected at one end to a strut. A split-fingered collet is mounted within the housing to insure reciprocal movement. A handle on the housing is connected to the collet for moving the collet into the insert where the fingers of the collet expand to lock the joint to the fitting.

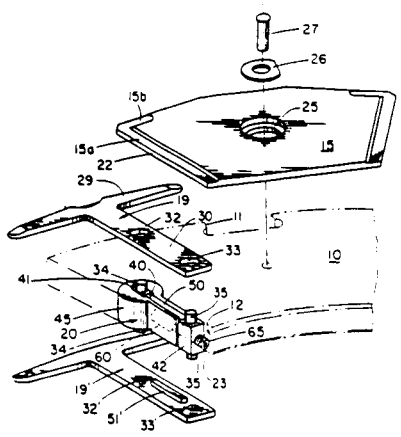
Official Gazette of the U.S. Patent and Trademark Office



N88-29181* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PRELOADED BRAKE DISC Patent
WILLIAM C. SCHNEIDER, inventor (to NASA), KORNEL NAGY, inventor (to NASA), and CLARENCE J. WESSELSKI, inventor (to NASA) 16 Aug. 1988 8 p Filed Nov. 10, 1987
(NASA-CASE-MSC-21132-1; US-PATENT-4,763,762; US-PATENT-APPL-SN-118992; US-PATENT-CLASS-188-218-XL; US-PATENT-CLASS-188-251-A) Avail: US Patent and Trademark Office CSCL 13I

A disc brake system for a shuttle orbiter is described, which has an annular disc element with internally radially directed and angularly spaced relief slots and trapezoidal shaped carbon pad members arranged circumferentially around the disc element. T clips snugly engage the outer heads of the pad members and are attached to rivet heads, and have guide members which slide into guide grooves in a spring housing. Springs provide a force tending to move the T clips toward the center of the disc where the magnitude of the force can be adjusted by a screw.

Official Gazette of the U.S. Patent and Trademark Office

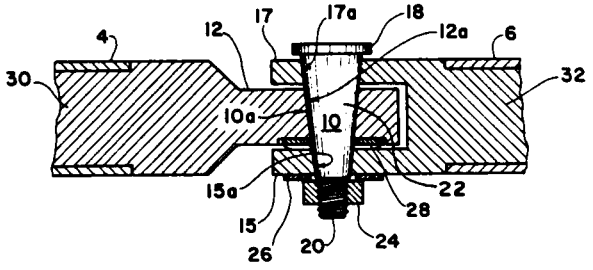


N88-30130*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CLEVIS JOINT FOR DEPLOYABLE SPACE STRUCTURES Patent Application
MARVIN D. RHODES, inventor (to NASA) 28 Jul. 1988 13 p
(NASA-CASE-LAR-13898-1; NAS 1.71:LAR-13898-1; US-PATENT-APPL-SN-225427) Avail: NTIS HC A03/MF A01 CSCL 13K

This invention relates generally to pin clevis joints, and more particularly, to zero play pin clevis joints for connecting structural members of a deployable space structure. A joint includes a pin, a tang, and a shackle. The pin is tapered at the same angle as the bores extending through the projections of the shackle and the tang. A spring washer biases the tang onto the tapered sidewall of the pin. The invention solves the free play problem associated with deployable space structures by using a tapered pin which is held in tapered holes by the spring washers.

NASA

FIG. 3



N88-30131* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ARC LENGTH CONTROL FOR PLASMA WELDING Patent
WILLIAM F. ICELAND, inventor (to NASA) (Rockwell International Corp., Canoga Park, Calif.) 23 Aug. 1988 8 p
(NASA-CASE-MSC-20900-1; US-PATENT-4,766,286; US-PATENT-APPL-SN-079317; US-PATENT-CLASS-219-121.57; US-PATENT-CLASS-219-124.02; US-PATENT-CLASS-219-130.4; US-PATENT-CLASS-219-121.54; US-PATENT-CLASS-219-121.56) Avail: U.S. Patent and Trademark Office CSCL 13H

A control system to be used with a plasma arc welding apparatus is disclosed. The plasma arc welding apparatus includes a plasma arc power supply, a contactor, and an electrode assembly for moving the electrode relative to a work piece. The electrode assembly is raised or lowered by a drive motor. The present apparatus includes a plasma arc adapter connected across the power supply to measure the voltage across the plasma arc. The plasma arc adapter forms a dc output signal input to a differential amplifier. A second input is defined by an adjustable resistor connected to a dc voltage supply to permit operator control. The differential amplifier forms an output difference signal provided to an adder circuit. The adder circuit then connects with a power amplifier which forms the driving signal for the motor. In addition, the motor connects to a tachometor which forms a feedback signal

delivered to the adder to provide damping, therby avoiding servo loop overshoot.

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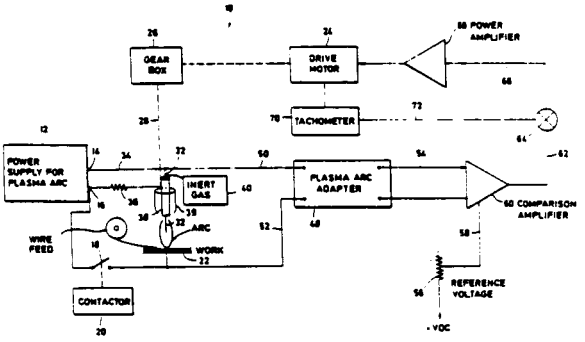


38

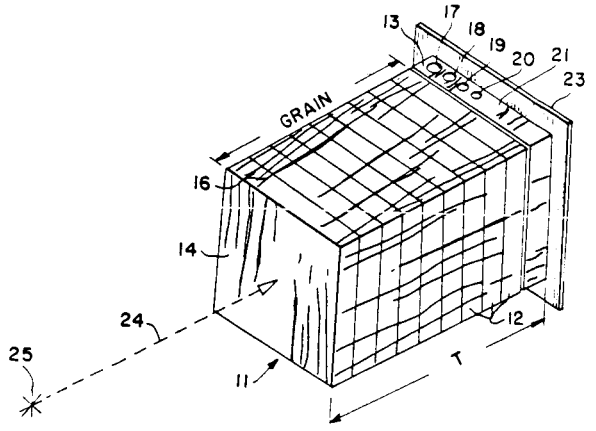
QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N88-23983*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
METHOD OF RADIOGRAPHIC INSPECTION OF WOODEN MEMBERS Patent Application
MAGGIE L. BERRY, inventor (to NASA) and ROBERT L. BERRY, inventor (to NASA) 25 Nov. 1987 11 p
(NASA-CASE-LAR-13724-1; NAS 1.71:LAR-13724-1; US-PATENT-APPL-SN-125678) Avail: NTIS HC A03/MF A01 CSCL 14D

The invention is a method to be used for radiographic inspection of a wooden specimen for internal defects which includes the steps of introducing a radiopaque penetrant into any internal defects in the specimen through surface openings; passing a beam of radiation through a portion of the specimen to be inspected; and making a radiographic film image of the radiation passing through the specimen, with the radiopaque penetrant in the specimen absorbing the radiation passing through it, therby enhancing the resulting image of the internal defects in the specimen.

NASA



39

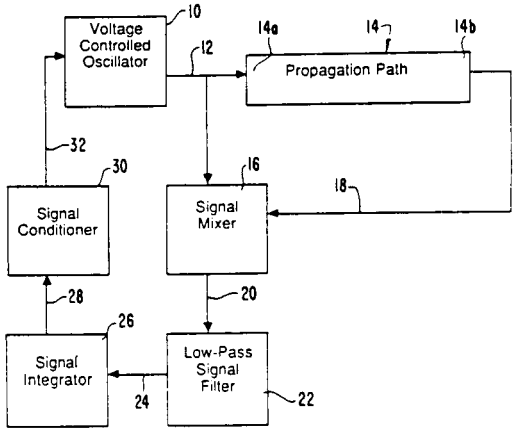
STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

N88-25011*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RADIO FREQUENCY (RF) STRAIN MONITOR Patent Application
JOSEPH S. HEYMAN, inventor (to NASA), ROBERT S. ROGOWSKI, inventor (to NASA), and MILFORD S. HOLBEN, JR., inventor (to NASA) (PRC Kentron, Inc., Hampton, Va.) 7 Jun. 1988 14 p
(NASA-CASE-LAR-13705-1; NAS 1.71:LAR-13705-1; US-PATENT-APPL-SN-203177) Avail: NTIS HC A03/MF A01 CSCL 20K

This invention relates to an apparatus for measuring strain in a structure. In particular, the invention detects strain in parts per million to over ten percent along an entire length (or other dimension) of a structure measuring a few millimeters to several kilometers. By using a propagation path bonded to the structure, the invention is not limited by the signal attenuation characteristics of the structure and thus frequencies in the megahertz to gigahertz range may be used to detect strain in part per million to over ten percent with high precision.

NASA

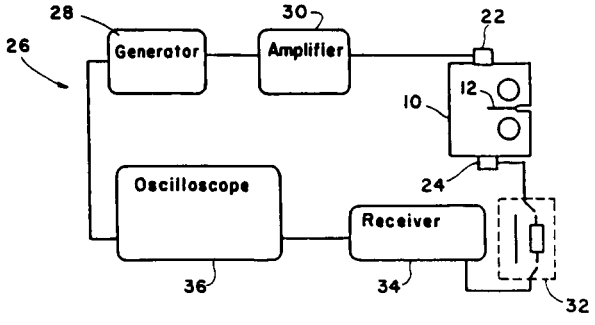


N88-30160*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ULTRASONIC METHOD AND APPARATUS FOR DETERMINING CRACK OPENING LOAD Patent Application
WILLIAM T. YOST, inventor (to NASA) 23 Jun. 1988 15 p
(NASA-CASE-LAR-13889-1; NAS 1.71:LAR-13889-1; US-PATENT-APPL-SN-210277) Avail: NTIS HC A03/MF A01 CSCL 20K

This invention relates generally to materials testing, and more particularly, to an ultrasonic apparatus for determining crack opening load in a specimen having a crack. A specimen having a crack is provided with a transmit transducer and a receive transmitter. An ultrasonic signal passing between the two transducers is mechanically rectified by the crack to produce a

second harmonic of the input signal. By measuring the peak harmonic amplitude while increasing the tension load on the specimen, a crack opening is determined.

NASA



declinations and inclinations of the work panels, tables, and visual display panels.

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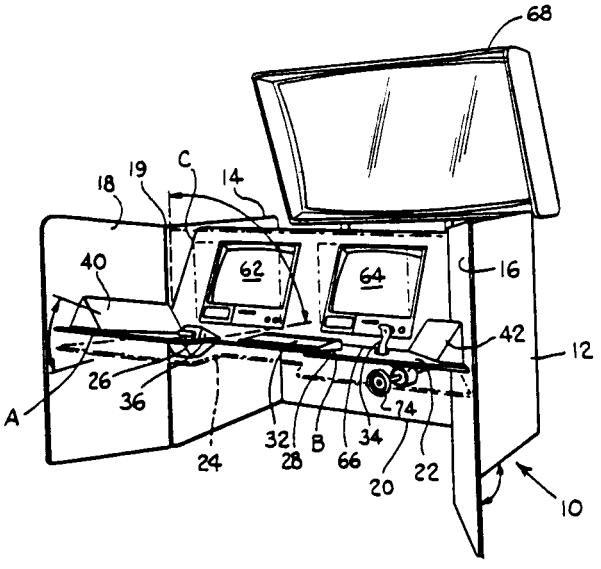

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N88-24163* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

RECONFIGURABLE WORK STATION FOR A VIDEO DISPLAY UNIT AND KEYBOARD Patent

NICHOLAS L. SHIELDS, inventor (to NASA), FRED D. ROE, JR., inventor (to NASA), MARY F. FAGG, inventor (to NASA), and DAVID E. HENDERSON, inventor (to NASA) (Essex Corp., Huntsville, Ala.) 16 Feb. 1988 9 p Filed 5 Dec. 1985 Supersedes N86-22114 (24 - 12, p 1995)
(NASA-CASE-MFS-26009-1-SB; US-PATENT-4,725,106; US-PATENT-APPL-SN-805011; US-PATENT-CLASS-312-208; US-PATENT-CLASS-108-3; US-PATENT-CLASS-108-7; US-PATENT-CLASS-312-7.2; US-PATENT-CLASS-312-196; US-PATENT-CLASS-312-300) Avail: US Patent and Trademark Office CSCL 05H

A reconfigurable workstation is described having video, keyboard, and hand operated motion controller capabilities. The workstation includes main side panels between which a primary work panel is pivotally carried in a manner in which the primary work panel may be adjusted and set in a negatively declined or positively inclined position for proper forearm support when operating hand controllers. A keyboard table supports a keyboard in such a manner that the keyboard is set in a positively inclined position with respect to the negatively declined work panel. Various adjustable devices are provided for adjusting the relative

60

COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

N88-24169* National Aeronautics and Space Administration. Pasadena Office, Calif.

REAL TIME PIPELINED SYSTEM FOR FORMING THE SUM OF PRODUCTS IN THE PROCESSING OF VIDEO DATA Patent

BRIAN WILCOX, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 7 Jun. 1988 8 p Filed 31 Dec. 1985 Supersedes N86-24225 (24 - 14, p 2339)
(NASA-CASE-NPO-16462-1-CU; US-PATENT-4,750,144; US-PATENT-APPL-SN-815106; US-PATENT-CLASS-364-728; US-PATENT-CLASS-364-757; US-PATENT-CLASS-382-42)
Avail: US Patent and Trademark Office CSCL 09B

A 3-by-3 convolver utilizes 9 binary arithmetic units connected in cascade for multiplying 12-bit binary pixel values P sub i which are positive or two's complement binary numbers by 5-bit magnitide (plus sign) weights W sub i which may be positive or negative. The weights are stored in registers including the sign bits. For a negative weight, the one's complement of the pixel value to be multiplied is formed at each unit by a bank of 17 exclusive or gates G sub i under control of the sign of the corresponding weight W sub i, and a correction is made by adding the sum of the absolute values of all the negative weights for each 3-by-3 kernel. Since this correction value remains constant as long as the weights are constant, it can be precomputed and stored in a

register as a value to be added to the product PW of the first arithmetic unit.

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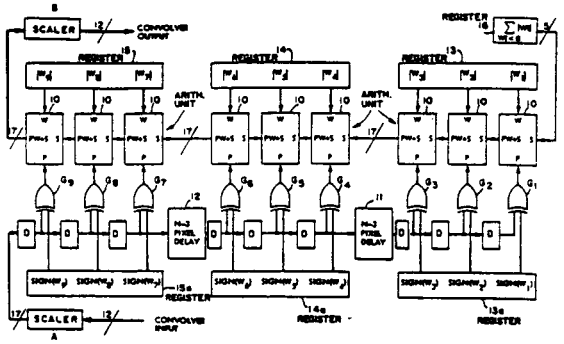

N88-29310* National Aeronautics and Space Administration. Pasadena Office, Calif.

NANOSEQUENCER DIGITAL LOGIC CONTROLLER Patent

CHARLES R. LAHMEYER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Aug. 1988 8 p Continuation of US-Patent-Appl-SN-587749, filed 9 Mar. 1984, abandoned

(NASA-CASE-NPO-16116-2; US-PATENT-4,766,533; US-PATENT-APPL-SN-004282; US-PATENT-CLASS-364-200; US-PATENT-APPL-SN-587749) Avail: US Patent and Trademark Office CSCL 09B

A digital logic controller provides instruction execution times on the order of 50 nanoseconds and employing read-only memory outputting instructions to a pipeline register, a portion of each instruction providing a status-select control signal and address signals for controlling selection of the next instruction from the read-only memory.

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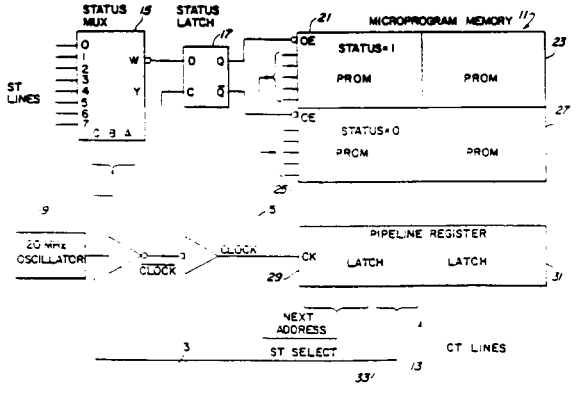

71

ACOUSTICS

Includes sound generation, transmission, and attenuation.

N88-24241* National Aeronautics and Space Administration. Pasadena Office, Calif.

SINGLE MODE LEVITATION AND TRANSLATION Patent

MARTIN B. BARMATZ, inventor (to NASA) and JAMES L. ALLEN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 12 Apr. 1988 10 p Filed 18 Oct. 1985 Supersedes N86-20087 (24 - 10, p 1663) Continuation-in-part of US-Patent-4,573,356, US-Patent-Appl-SN-627537, dated 3 Jul. 1984

(NASA-CASE-NPO-16675-1-CU; US-PATENT-4,736,815; US-PATENT-APPL-SN-789266; US-PATENT-CLASS-181-0.5; US-PATENT-CLASS-73-505; US-PATENT-CLASS-367-191; US-PATENT-APPL-SN-627537; US-PATENT-4,573,356) Avail: US Patent and Trademark Office CSCL 20A

A single frequency resonance mode is applied by a transducer to acoustically levitate an object within a chamber. This process allows smooth movement of the object and suppression of unwanted levitation modes that would urge the object to a different levitation position. A plunger forms one end of the chamber, and the frequency changes as the plunger moves. Acoustic energy is applied to opposite sides of the chamber, with the acoustic energy on opposite sides being substantially 180 degrees out of phase.

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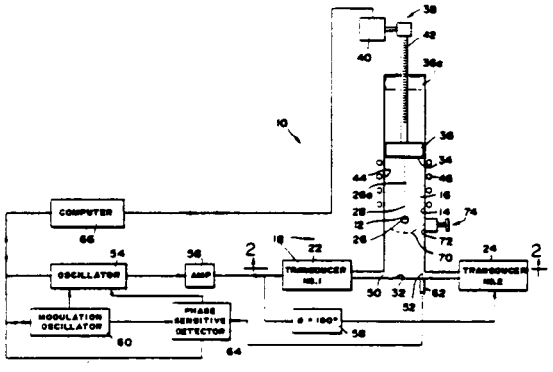

72

ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N88-24253* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ION GENERATOR AND ION APPLICATION SYSTEM Patent

ALAN P. BIDDLE, inventor (to NASA), NOBIE H. STONE, inventor (to NASA), DAVID L. REASONER, inventor (to NASA), WILLIAM L. CHISHOLM, inventor (to NASA), and JOHN M. REYNOLDS, inventor (to NASA) 3 May 1988 8 p Filed 3 Mar. 1987 Supersedes N87-25829 (25 - 19, p 2657)

(NASA-CASE-MFS-28122-1; US-PATENT-4,742,232; US-PATENT-APPL-SN-021100; US-PATENT-CLASS-250-427; US-PATENT-CLASS-250-423-R; US-PATENT-CLASS-250-251; US-PATENT-CLASS-315-111.41; US-PATENT-CLASS-315-111.71; US-PATENT-CLASS-315-111.81) Avail: US Patent and Trademark Office CSCL 20H

A vacuum chamber within which an instrument to be calibrated

or tested is placed, is fitted with an ion gun having an ion source. The source has an electron emitting filament positioned adjacent to one end of an ionization chamber, with a negatively biased grid located behind the filament. Gas is injected into the source by a gas flow regulator in one end of the source. The chamber is surrounded by a plurality of independently energizable coils, with the last coil being operated at the highest current level, thus producing the highest magnetic flux. This presents a region of magnetic repulsion to the electrons produced by the filament and causes them to be confined between the grid and the region, greatly increasing the chances that an ionization collision will occur between the electrons and atoms of the injected gas. Ions are extracted from the ionization chamber by a negatively biased extractor grid positioned adjacent to an opposite end of the chamber and are collimated by a negatively biased shield grid positioned adjacent to the extractor grid.

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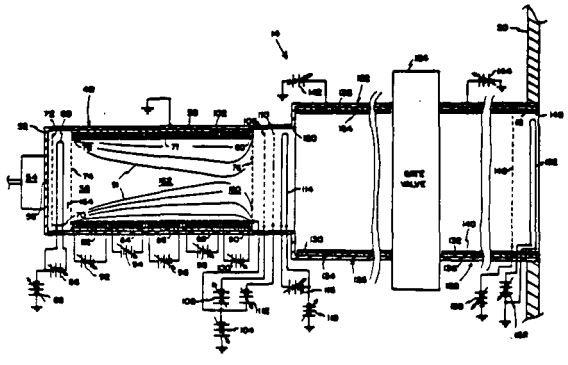
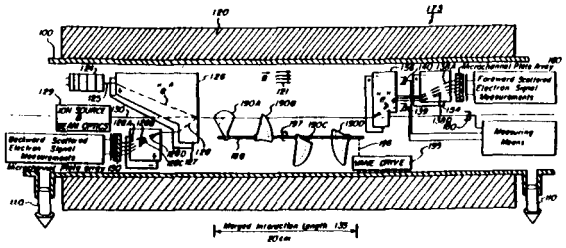




74

OPTICS

Includes light phenomena; and optical devices.

N88-25281*# National Aeronautics and Space Administration. Pasadena Office, Calif.

TROCHOIDAL ANALYSIS OF SCATTERED ELECTRONS IN A MERGED ELECTRON-ION BEAM Patent Application

ARA CHUTJIAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 4 Sep. 1987 19 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-16789-1-CU; NAS 1.71:NPO-16789-1-CU; US-PATENT-APPL-SN-154713) Avail: NTIS HC A03/MF A01 CSCL 20H

The method and apparatus of this invention provides a plurality of measurements indicative of the absolute cross section for excitation of an ion beam. The ion beam is merged for excitation by specific energies of electrons in an electron beam. Both beams are merged in an evacuated enclosure having a longitudinal magnetic field and a crossed uniform electric field. The ions and electrons interact over a known merged longitudinal length in a merged beam area. After collision, the electron and ion beams are demerged. Forward and backward-scattered electrons are collected and position-detected by a pair of microchannel plate arrays located at opposite ends of said longitudinal beam-merging area. A series of electron and ion primary current measurements are taken at full ion and electron beam strength. Measurements are also taken at greatly reduced beam strength to obtain a beam overlap profile.

NASA

N88-24508*# National Aeronautics and Space Administration. Pasadena Office, Calif.

DYNAMIC RANGE COMPRESSION/EXPANSION OF LIGHT BEAMS BY PHOTOREFRACTIVE CRYSTALS Patent Application

LI-JEN CHENG, inventor (to NASA) and HUA-KUANG LIU, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 24 Nov. 1987 14 p

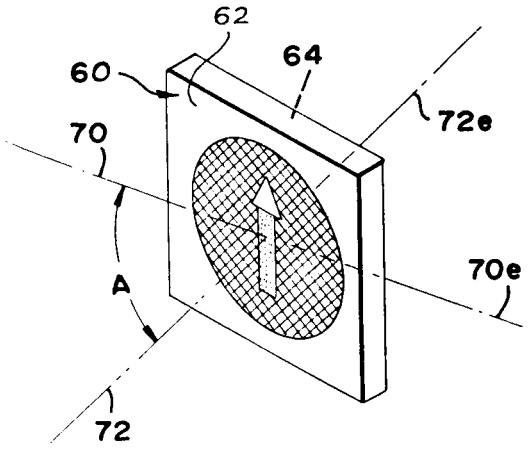
(Contract NAS7-918)

(NASA-CASE-NPO-17140-1-CU; NAS 1.71:NPO-17140-1-CU; US-PATENT-APPL-SN-125021; JPL-17140) Avail: NTIS HC A03/MF A01 CSCL 20F

An apparatus is provided which greatly reduces the intensity of bright portions of an image while only moderately reducing the brightness of dimmer portions of the image, to thereby compress the range of light intensities to facilitate detection of the image. The apparatus includes a light detector device formed by a chip of photorefractive material. A two-dimensional array of light beams from an object to be detected passes through a beam splitter to form two arrays of light beams. The two arrays of light beams are directed at different angles against a surface of the chip of photorefractive material, the two arrays of light beams forming coincident images on the surface. One of the two-dimensional arrays of beams emerging from an opposite surface of the chip has a lower range of intensities, to facilitate detection of the object despite very bright spots in its image. The other array of light

beams emerging from the chip has a greater range of intensities than the unprocessed image of the object.

NASA



N88-25301*# National Aeronautics and Space Administration. Pasadena Office, Calif.

REAL-TIME OPTICAL MULTIPLE OBJECT RECOGNITION AND TRACKING SYSTEM AND METHOD Patent Application

TIEN-HSIN CHAO, inventor (to NASA) and HUA KUANG LIU, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 10 Dec. 1987 18 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-17139-1-CU; NAS 1.71:NPO-17139-1-CU; US-PATENT-APPL-SN-154718) Avail: NTIS HC A03/MF A01 CSCL 20A

The invention relates to an apparatus and associated methods for the optical recognition and tracking of multiple objects in real time. Multiple point spatial filters are employed that pre-define the objects to be recognized at run-time. The system takes the basic technology of a Vander Lugt filter and adds a hololens. The technique replaces time, space and cost-intensive digital techniques. In place of multiple objects, the system can also recognize multiple orientations of a single object. This later capability has potential for space applications where space and weight are at a premium.

NASA

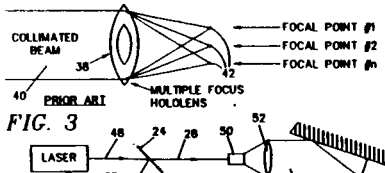
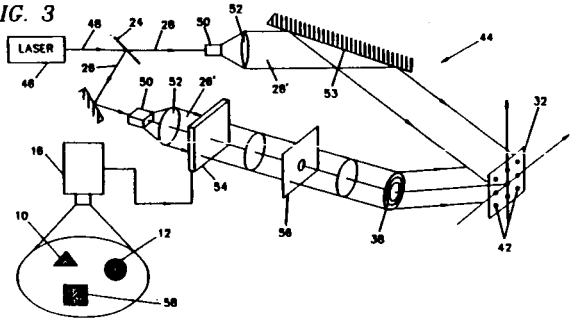


FIG. 3



N88-25302*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

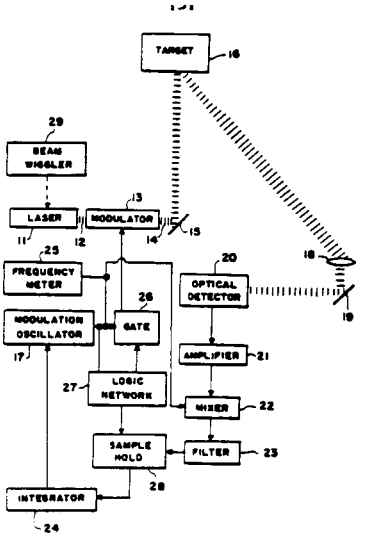
PHASE LENGTH OPTICAL PHASE-LOCKED-LOOP SENSOR Patent Application

JOSEPH S. HEYMAN, inventor (to NASA) 11 Feb. 1988 12 p

(NASA-CASE-LAR-13387-1; NAS 1.71:LAR-13387-1; US-PATENT-APPL-SN-154716) Avail: NTIS HC A03/MF A01 CSCL 20F

The invention is a device that provides a high resolution measurement of the change in optical phase length from the device optical system source to an optical reflector. The invention consists of a optical phase locked loop that uses a laser beam as a carrier of an intensity modulated energy source. The novelty of the invention appears to lie in the overall combination of elements which provide high resolution without loss of wide dynamic range. The invention does not depend on coherent reflection from a target, and thus can measure targets that do not have special preparation or corner reflectors. The use of carrier modulation achieves high resolution without the problems of high speed pulse duration systems. Thus the invention has the advantages of simplicity, low cost, and small size without sacrificing resolution.

NASA



N88-25303*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

OPTICAL PRESSURE SEALING COUPING (LIGHT JOINT) Patent Application

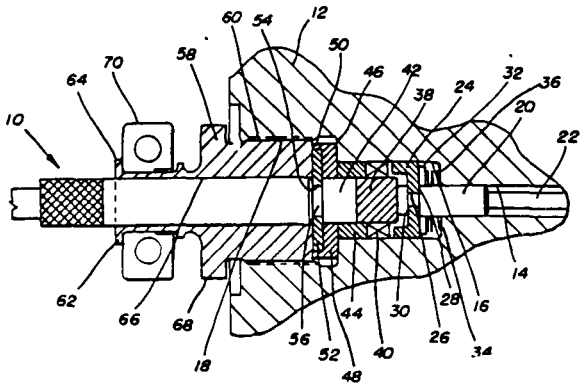
TIMOTHY IRVIN, inventor (to NASA) and RICHARD FRENCH, inventor (to NASA) (Rockwell International Corp., Canoga Park, Calif.) 16 Feb. 1988 14 p

(NASA-CASE-MFS-29348-1; NAS 1.71:MFS-29348-1; US-PATENT-APPL-SN-156518) Avail: NTIS HC A03/MF A01 CSCL 20F

The invention is directed toward an optical pressure sealing coupling providing pressure sealing feed through a fiber optic probe used as a monitoring device. The invention is primarily adapted for feeding optical signals from one section of a probe under high pressure cryogenic conditions to another section of the probe at ambient pressure. The novelty of the convention is in the combination of optically coupling and sealing the probe against the high pressure differential while maintaining discrete optical send/receive channels through the connection despite vibration. The advantages appear to be a rugged coupling having sensitive

optics contained internally and eliminates the requirement of independently sealing the probe itself.

NASA



N88-25304*# National Aeronautics and Space Administration. Pasadena Office, Calif.

LOW-LOSS, HIGH-ISOLATION, FIBER-OPTIC ISOLATOR Patent Application

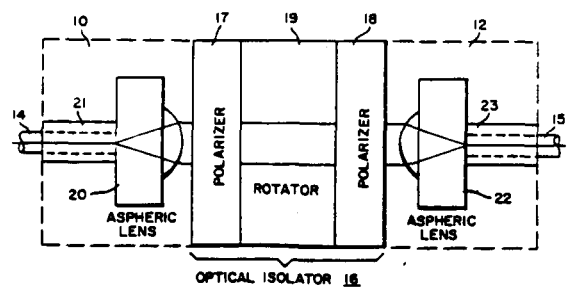
GEORGE F. LUTES, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 31 Mar. 1988 11 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-17207-1-CU; NAS 1.71:NPO-17207-1-CU; US-PATENT-APPL-SN-190185) Avail: NTIS HC A03/MF A01 CSCL 20F

A low-loss, high-isolation, fiber-optic isolator for use in single-mode fiber systems utilizes a Faraday rotator and two polarizers, one at each end angularly oriented from each other at the angle of rotation for isolation, and two aspheric lens connectors to couple optical fibers to the Faraday isolator to reduce forward loss to about 2.5 dB and improve isolation to greater than 70 dB.

NASA



N88-25305*# National Aeronautics and Space Administration. Pasadena Office, Calif.

REAL-TIME IMAGE DIFFERENCE DETECTION USING A POLARIZATION ROTATION SPACIAL LIGHT MODULATOR Patent Application

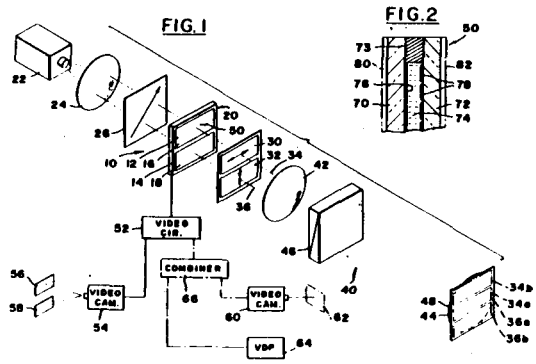
TIEN-HSIN CHAO, inventor (to NASA) and HUA-KUANG LIU, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 18 Apr. 1988 16 p Prepared in cooperation with Jet propulsion Lab., California Inst. of Tech., Pasadena.

(Contract NAS7-918)

(NASA-CASE-NPO-17144-1-CU; NAS 1.71:NPO-17144-1-CU; US-PATENT-APPL-SN-187716) Avail: NTIS HC A03/MF A01 CSCL 20F

An image difference detection system is described, of the type wherein two created image representations such as transparencies representing the images to be compared lie coplanar, while light passes through the two transparencies and is formed into coincident images at the image plane for comparison. The two transparencies are formed by portions of a polarization-rotation spatial light modulator display such as a multi-pixel liquid crystal display or a magnetooptical rotation type display. In a system where light passing through the two transparencies is polarized in transverse directions to enable the use of a Wollaston prism to bring the images into coincidence, a liquid crystal display can be used which is devoid of polarizing sheets that would interfere with transverse polarizing of the light passing through the two transparencies.

NASA



76

SOLID-STATE PHYSICS

Includes superconductivity.

N88-24543* National Aeronautics and Space Administration. Pasadena Office, Calif.

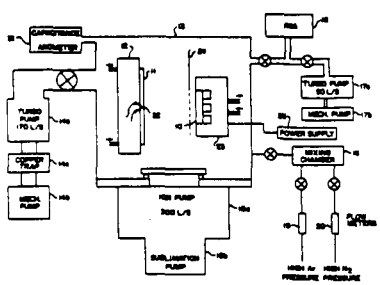
METHOD OF PRODUCING HIGH T(SUBC) SUPERCONDUCTING NBN FILMS Patent

SARITA THAKOOR, inventor (to NASA), JAMES L. LAMB, inventor (to NASA), ANILKUMAR P. THAKOOR, inventor (to NASA), and SATISH K. KHANNA, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Feb. 1988 13 p Filed 12 Aug. 1985 Supersedes N86-21401 (24 - 11, p 1878)

(NASA-CASE-NPO-16681-1-CU; US-PATENT-4,726,890; US-PATENT-APPL-SN-764812; US-PATENT-CLASS-204-192.24; US-PATENT-CLASS-204-192.15) Avail: US Patent and Trademark Office CSCL 20L

Thin films of niobium nitride with high superconducting temperature (T sub c) of 15.7 K are deposited on substrates held at room temperature (approx 90 C) by heat sink throughout the sputtering process. Films deposited at P sub Ar 12.9 + or - 0.2 mTorr exhibit higher T sub c with increasing P sub N2,I with the highest T sub c achieved at P sub n2,I= 3.7 + or - 0.2 mTorr and total sputtering pressure P sub tot = 16.6 + or - 0.4. Further increase of N2 injection starts decreasing T sub c.

Official Gazette of the U.S. Patent and Trademark Office



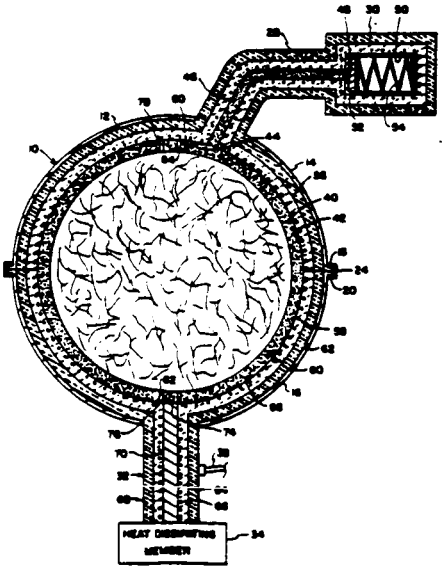
N88-24544* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

METHOD AND APPARATUS FOR GROWING CRYSTALS Patent

ROBERT J. NAUMANN, SANDOR L. LEHOCZKY, and DONALD O. FRAZIER 19 Apr. 1988 11 p Filed 31 Oct. 1986 Supersedes N87-19116 (25 - 11, p 1527)
(NASA-CASE-MFS-28137-1; US-PATENT-4,738,831; US-PATENT-APPL-SN-925189; US-PATENT-CLASS-422-246; US-PATENT-CLASS-156-607; US-PATENT-CLASS-156-621; US-PATENT-CLASS-156-624; US-PATENT-CLASS-156-DIG.70; US-PATENT-CLASS-156-DIG.72; US-PATENT-CLASS-156-DIG.82)
Avail: US Patent and Trademark Office CSCL 20L

A method and apparatus for bulk growth of defect-free compound crystals is described. Crystal growth is conducted in this invention in an apparatus having an enclosure with a spherical interior provided with an adjustable heat source. A seed crystal is positioned within this interior and is connected to one end of a rod of heat conductive material which extends through the enclosure. The rod is independently heated, and a heat absorber is connected to an opposite end of the rod. Crystalline material is placed in the interior of the sphere and in engagement with the seed crystal and pressure is applied to it. Encapsulant material having a slightly lower melting point than the crystalline material is disposed between the latter and the spherical container wall. A crystal structure is grown by heating the crystalline material up to a set temperature while controlling heat dissipation through the rod by the application of heat to the rod. Heat application is reduced, allowing heat to escape via the seed crystal and the rod of the material, causing the crystalline material to be deposited as a single crystal on the seed crystal. The novelty of the invention is believed to reside in the use of a spherical container with with a heat removal rod at one pole of the sphere, the rod providing control of the shape of the crystal-liquid interface during solidification. These feature permit growth of relatively large, defect-free crystals of compound materials.

Official Gazette of the U.S. Patent and Trademark Office



N88-24545* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

LIQUID ENCAPSULATED FLOAT ZONE PROCESS AND APPARATUS Patent

ROBERT J. NAUMANN, inventor (to NASA), DONALD O. FRAZIER, inventor (to NASA), SANDOR L. LEHOCZKY, inventor (to NASA), MARCUS VLASSE, inventor (to NASA), and BARBARA R. FACEMIRE, inventor (to NASA) 26 Apr. 1988 7 p Filed 29 Oct. 1986 Supersedes N87-15004 (25 - 06, p 826)
(NASA-CASE-MFS-28144-1; US-PATENT-4,740,264; US-PATENT-APPL-SN-924399; US-PATENT-CLASS-156-620.76; US-PATENT-CLASS-156-DIG.70; US-PATENT-CLASS-156-DIG.72; US-PATENT-CLASS-156-DIG.82; US-PATENT-CLASS-156-DIG.84; US-PATENT-CLASS-156-DIG.89; US-PATENT-CLASS-156-DIG.92)
Avail: US Patent and Trademark Office CSCL 20L

The process and apparatus for growing crystals using float zone techniques are described. A rod of crystalline materials is disposed in a cylindrical container, leaving a space between the rod and container walls. This space is filled with an encapsulant, selected to have a slightly lower melting point than the crystalline material. The rod is secured to a container end cap at one end and to a shaft at its other end. A piston slides over the rod and provides pressure to prevent loss of volatile components upon melting of the rod. Prior to melting the rod the container is first heated to melt the encapsulant, with any off-gas from this step being vented to a cavity behind the piston. The piston moves slightly forward owing to volume change upon melting of the encapsulant, and the vent passageway is closed. The container is then moved longitudinally through a heated zone to progressively melt sections of the rod as in conventional float zone processes. The float zone technique may be used in the microgravity environment of space.

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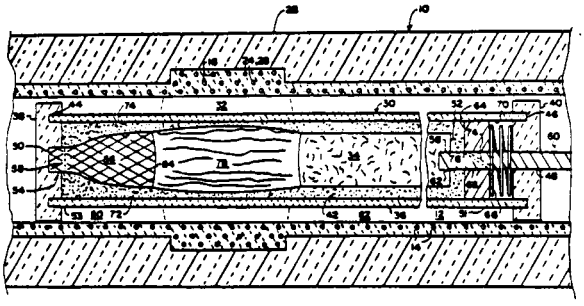


N88-25355*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

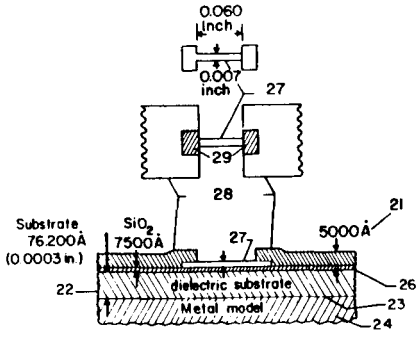
METHOD OF FORMING A MULTIPLE LAYER DIELECTRIC AND A HOT FILM SENSOR THEREWITH Patent Application

PURNELL HOPSON, JR., inventor (to NASA) and SANG Q. TRAN, inventor (to NASA) 1 Apr. 1988 18 p
(NASA-CASE-LAR-13678-1; NAS 1.71:LAR-13678-1; US-PATENT-APPL-SN-176547) Avail: NTIS HC A03/MF A01 CSCL 20L

The invention is a method of forming a multiple layer dielectric for use in a hot-film laminar separation sensor. The multiple layer dielectric substrate is formed by depositing a first layer of a thermoelastic polymer such as on an electrically conductive substrate such as the metal surface of a model to be tested under cryogenic conditions and high Reynolds numbers. Next, a second dielectric layer of fused silica is formed on the first dielectric layer of thermoplastic polymer. A resistive metal film is deposited on selected areas of the multiple layer dielectric substrate to form one or more hot-film sensor elements to which aluminum electrical

circuits deposited upon the multiple layered dielectric substrate are connected.

NASA



N88-25356*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

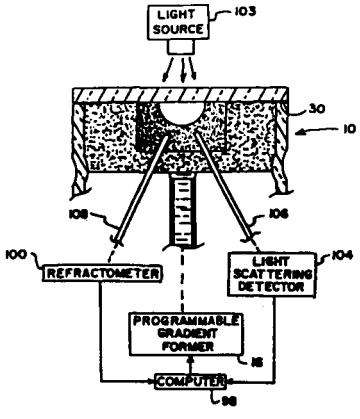
HANGING DROP CRYSTAL GROWTH APPARATUS AND METHOD Patent Application

DANIEL C. CARTER, inventor (to NASA) and ROBBIE SMITH, inventor (to NASA) (Tennessee Scientific Glass Co.) 23 Mar. 1988 20 p

(NASA-CASE-MFS-28206-1-SB; NAS 1.71:MFS-28206-1-SB; US-PATENT-APPL-SN-172101) Avail: NTIS HC A03/MF A01 CSCL 20B

This invention relates generally to hanging drop crystal growth devices and methods, and more particularly to such a device wherein the drop containing protein to be crystallized is exposed to vapor from a flow of control fluid, with this control fluid having a vapor pressure which varies as solvent is drawn from the drop. A hanging drop apparatus is constructed having a cylindrical enclosure, with a wicking element or disc constructed of sintered glass and being mounted in an upper portion thereof. A well or recess is cut into an upper side of the disc. A cover slip or plate having a protein drop disposed thereon is sealably positioned on the disc, with the drop being positioned in the well. A flow of control fluid is generated by a programmable gradient former, with this flow being coupled to the disc. The vapor pressure of the control fluid is initially selected to be considerably lower than that of the drop, causing solvent in the drop to readily evaporate. As evaporation progresses, the vapor pressure of the control fluid is adjusted to slow the rate of evaporation from the drop, allowing a slow approach to the critical supersaturation point of the protein to be crystallized. The novelty of this invention particularly lies in exposing the drop to a control fluid having a variable pressure. Further novelty lies in the particular apparatuses and methods by which this is accomplished.

NASA



N88-25357*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

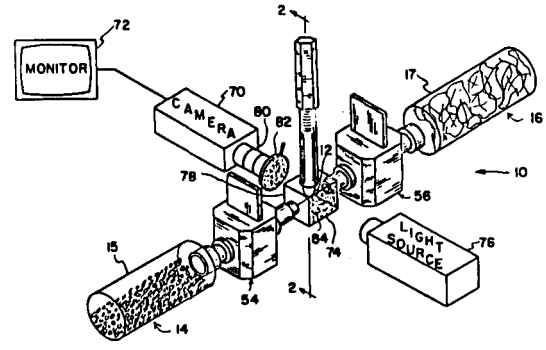
CRYSTAL GROWTH APPARATUS Patent Application

FRED HERRMANN, inventor (to NASA) and BLAIR HERREN, inventor (to NASA) 29 Feb. 1988 17 p

(NASA-CASE-MFS-28182-1; NAS 1.71:MFS-28182-1; US-PATENT-APPL-SN-161681) Avail: NTIS HC A03/MF A01 CSCL 20L

This invention relates generally to crystal growth devices, and more particularly to a device in which protein crystals are grown in a hanging drop. The drop is suspended from a surface positioned in the interior of an enclosure which is sealably coupled via a valve to a vessel containing solvent used in the drop. A second opening in the enclosure is coupled via a valve to a vessel containing a selected desiccant material. The valve may be fully or partially opened to add a selected quantity of solvent in a vapor phase to the drop, and the valve may be fully or partially opened to cause a selected quantity of solvent to evaporate from the drop. The process is monitored by a camera, and in conjunction with a graduated pattern superimposed over the drop, relative volumes of the drop are determined. Alternately, the process may be automated by using a computer coupled to servo motors, which in turn are coupled to and operate a cap and valves, respectively. The computer is responsive to a detection device which detects changes of light passing through the drop from the light source.

NASA



N88-25358*# National Aeronautics and Space Administration. Pasadena Office, Calif.

IMPROVED PROPERTIES OF SIGE/GAP ALLOYS Patent Application

JAN W. VANDERSANDE, inventor (to NASA), CHARLES WOOD, inventor (to NASA), and SUSAN L. DRAPER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 Apr. 1988 16 p Prepared in cooperation with Jet Propulsion Lab., California Inst. of Tech., Pasadena.

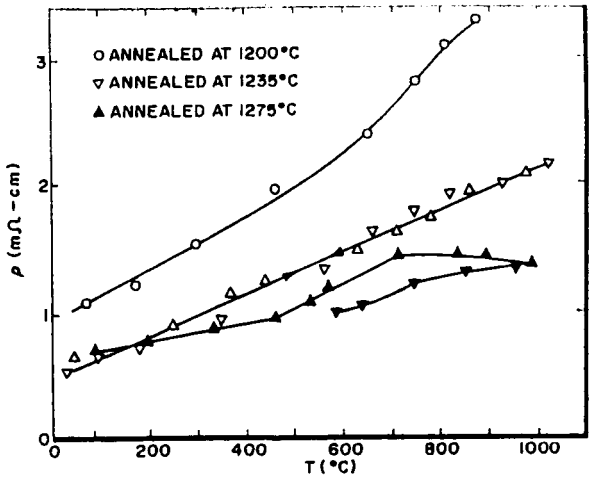
(Contract NAS7-918)

(NASA-CASE-NPO-17259-1-CU; NAS 1.71:NPO-17259-1-CU; US-PATENT-APPL-SN-184234) Avail: NTIS HC A03/MF A01 CSCL 20L

The thermoelectric conversion efficiency of a GaP doped SiGe alloy is improved about 30 percent by annealing the alloy at a temperature above the melting point of the alloy, preferably stepwise from 1200 C to 1275 C in air to form large grains having

a size over 50 microns and to form a GeGaP rich phase and a silicon rich phase containing SiP and SiO2 particles.

NASA



N88-29602*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

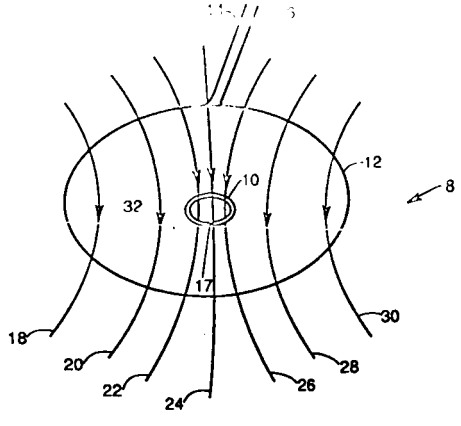
PLANAR THIN FILM SQUID WITH INTEGRAL FLUX CONCENTRATOR Patent Application

PALMER N. PETERS, inventor (to NASA) and ROBERT C. SISK, inventor (to NASA) 11 Jul. 1988 15 p

(NASA-CASE-MFS-28282-1; NAS 1.71:MFS-28282-1; US-PATENT-APPL-SN-217533) Avail: NTIS HC A03/MF A01 CSCL 20L

A thin film SQUID is disclosed having improved flux concentration combined with simplicity of design and fabrication. The SQUID starts with a wafer like substrate having simple planar geometry. A large area of superconducting film is coated on the substrate, with a small open or uncoated area remaining at its center to define a SQUID loop, and a gap in the film formed, beginning at the outer circumferential edge of the substrate and extending radially inward to the open area. A Josephson junction is formed across the gap near the open area to interrupt the electrical continuity of the SQUID loop. A coil is attached to the surface of the substrate, electrically insulated from the superconducting film, and is energized to induce flux within the SQUID which is concentrated within the open area.

NASA



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The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table.

STANDING ORDER SUBSCRIPTIONS

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NASA Case Number Prefix Letters	Address of Cognizant NASA Patent Counsel
ARC-xxxxx XAR-xxxxx	Ames Research Center Mail Code: 200-11A Moffett Field, California 94035 Telephone: (415) 694-5104
ERC-xxxxx XER-xxxxx HQN-xxxxx XHQ-xxxxx	NASA Headquarters Mail Code: GP Washington, D.C. 20546 Telephone: (202) 453-2417
GSC-xxxxx XGS-xxxxx	Goddard Space Flight Center Mail Code: 204 Greenbelt, Maryland 20771 Telephone: (301) 286-7351
KSC-xxxxx XKS-xxxxx	John F. Kennedy Space Center Mail Code: PT-PAT Kennedy Space Center, Florida 32899 Telephone: (305) 867-2544
LAR-xxxxx XLA-xxxxx	Langley Research Center Mail Code: 279 Hampton, Virginia 23365 Telephone: (804) 865-3725
LEW-xxxxx XLE-xxxxx	Lewis Research Center Mail Code: 500-318 21000 Brookpark Road Cleveland, Ohio 44135 Telephone: (216) 433-5753
MSC-xxxxx XMS-xxxxx	Lyndon B. Johnson Space Center Mail Code: AL3 Houston, Texas 77058 Telephone: (713) 483-4871
MFS-xxxxx XMF-xxxxx	George C. Marshall Space Flight Center Mail Code: CC01 Huntsville, Alabama 35812 Telephone: (205) 544-0024
NPO-xxxxx XNP-xxxxx FRC-xxxxx XFR-xxxxx WOO-xxxxx	NASA Resident Legal Office Mail Code: 180-801 4800 Oak Grove Drive Pasadena, California 91103 Telephone: (818)354-2700

PATENT LICENSING REGULATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

14 CFR Part 1245

Licensing of NASA Inventions

AGENCY: National Aeronautics and Space Administration.

ACTION: Interim regulation with comments requested.

SUMMARY: The National Aeronautics and Space Administration (NASA) is revising its patent licensing regulations to conform with Pub L. 96-517. This interim regulation provides policies and procedures applicable to the licensing of federally owned inventions in the custody of the National Aeronautics and Space Administration, and implements Pub L. 96-517. The object of this subpart is to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

EFFECTIVE DATE: July 1, 1981. Comments must be received in writing by December 2, 1981. Unless a notice is published in the **Federal Register** after the comment period indicating changes to be made, this interim regulation shall become a final regulation.

ADDRESS: Mr. John G. Mannix, Director of Patent Licensing, GP-4, NASA, Washington, D.C. 20546.

FOR FURTHER INFORMATION CONTACT:

Mr John G Mannix, (202) 755–3954.

SUPPLEMENTARY INFORMATION:

PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2 of Part 1245 is revised to read as follows

• • • • •

Subpart 2—Licensing of NASA Inventions

Sec.

Authority: 35 U.S.C. Section 207 and 208, 94 Stat 3023 and 3024.

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Subpart 2—Licensing of NASA Inventions

§ 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions, and procedures upon which a NASA invention may be licensed. It does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts, (c) are the result of an authorized exchange of rights in the settlement of patent disputes; or (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

§ 1245.202 Definitions.

(a) "Federally owned invention" means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) "Federal agency" means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a Federally owned invention.

(c) "NASA Invention" means a Federally owned invention with respect to which NASA maintains custody and administration, in whole or in part, of the right, title or interest in such invention on behalf of the United States Government.

(d) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 C.F.R. 121.3–8, and in subcontracting, contained in 13 CFR 121.3–12, will be used.

(e) Practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(f) "United States" means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

§ 1245.203 Authority to grant licenses.

NASA inventions shall be made available for licensing as deemed appropriate in the public interest. NASA may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this subpart on inventions in its custody.

Restrictions and Conditions

§ 1245.204 All licenses granted under this subpart.

(a) *Restrictions.* (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) *Conditions.* Licenses shall contain such terms and conditions as NASA determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this subpart. The following terms and conditions apply to any license:

(1) The duration of the license shall be for a period specified in the license agreement, unless sooner terminated in accordance with this subpart.

(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas, or both.

(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of NASA, except to the successor of that part of the licensee's business to which the invention pertains.

(4) The license may provide the licensee the right to grant sublicenses under the license, subject to the approval of NASA. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to NASA.

(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.

(7) All licenses shall normally require royalties or other consideration.

(8) Where an agreement is obtained pursuant to § 1245.204(a)(2) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:

(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;

(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement; or

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

Types of Licenses

§ 1245.205 Nonexclusive licenses.

(a) *Availability of licenses.* Nonexclusive licenses may be granted under NASA inventions without publication of availability or notice of a prospective license.

(b) *Conditions.* In addition to the provisions of § 1245.204, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, NASA may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

§ 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on NASA inventions: (i) 3 months after notice of the invention's availability has been announced in the **Federal Register**; or (ii) without such notice where NASA determines that expeditious granting of such a license will best serve the interests of the Federal Government and the public; and (iii) in either situation, specified in (a)(1)(i) or (ii) of this section only if:

(A) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the **Federal Register**, providing opportunity for filing written objections within a 60-day period;

(B) After expiration of the period in § 1245.206(a) (1)(iii)(A) and consideration of nay written objections received during the period, NASA has determined that:

(*1*) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;

(*2*) The desired practial application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(*3*) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(*4*) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(C) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(D) NASA has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to domestic exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to NASA the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) Foreign licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on a NASA invention covered by a foreign patent, patent application, or other form of protection, provided that:

(i) Notice of a prospective license,

identifying the invention and prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections within a 60-day period and following consideration of such objections;

(ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced; and

(iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to foreign exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii) The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) *Record of determinations.* NASA shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

Procedures

§ 1245.207 Application for a license.

An application for a license should be addressed to the Patent Counsel at the NASA installation having responsibility for the invention and shall normally include:

(a) Identification of the invention for which the license is desired, including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted;

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of representative of applicant to whom correspondence should be sent;

(e) Nature and type of applicant's business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;

(f) Source of information concerning the availability of a license on the invention;

(g) A statement indicating whether applicant is a small business firm as defined in § 1245.202(c);

(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include:

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention; and

(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both;

(i) Identification of licenses previously granted to applicant under Federally owned inventions;

(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

§ 1245.208 Processing applications.

(a) Applications for licenses will be initially reviewed by the Patent Counsel of the NASA installation having responsibility for the invention. The Patent Counsel shall make a preliminary recommendation to the Director of Licensing, NASA Headquarters, whether to: (1) grant the license as requested, (2) grant the license with modification after negotiation with the licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the Federal Register in accordance with § 1245.206(a)(1)(iii)(A) or § 1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

(c) If the requested license, including any negotiated modifications, is denied by the Assistant General Counsel for Patent Matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with § 1245.211.

§ 1245.209 Notice to Attorney General.

A copy of the notice provided for in §§ 1245.206(a)(1)(iii)(A), and 1245.206(b)(1)(i) will be sent to the Attorney General.

§ 1245.210 Modification and termination of licenses.

Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicensee of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.

§ 1245.211 Appeals.

(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:

(1) A person whose application for a license has been denied;

(2) A licensee whose license has been modified or terminated, in whole or in part; or

(3) A person who timely filed a written objection in response to the notice required by §§ 1245.206(a)(1)(iii)(A) or

1245.206(b)(1)(i) and who can demonstrate to the satisfaction of NASA that such person may be damaged by the Agency action.

(b) Written notice of appeal must be filed within 30 days (or such other time as may be authorized for good cause shown) after receiving notice of the adverse decision or determination; including, an adverse decision following the request for reconsideration under § 1245.208(c). The notice of appeal, along with all supporting documentation should be addressed to the Administrator, National Aeronautics and Space Administration, Washington. DC 20546. Should the appeal raise a genuine dispute over material facts, fact-finding will be conducted by the NASA Inventions and Contributions Board. The person filing the appeal shall be afforded an opportunity to be heard and to offer evidence in support of the appeal. The Chairperson of the Inventions and Contributions Board shall prepare written findings of fact and transmit them to the Administrator or designee. The decision on the appeal shall be made by the NASA Administrator or designee. There is no further right of administrative appeal from the decision of the Administrator or designee.

§ 1245.212 Protection and administration of inventions.

NASA may take any suitable and necessary steps to protect and administer rights to NASA inventions, either directly or through contract.

§ 1245.213 Transfer of custody.

NASA having custody of certain Federally owned inventions may transfer custody and administration in whole or in part, to another Federal agency, of the right, title, or interest in any such invention.

§ 1245.214 Confidentiality of information.

Title 35, United States Code, section 209, provides that any plan submitted pursuant to § 1245.207(h) and any report required by § 1245.204(b)(6) may be treated by NASA as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

James M. Beggs,

Administrator.

October 15, 1981.

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15. Supplementary Notes

Section 1: Abstracts

16. Abstract

Abstracts are provided for 124 patents and patent applications entered into the NASA scientific and technical information system during the period July 1988 through December 1988. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.

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